The Builder.

VOL. XXV.—No. 1277.

Technical Education.

ET the ultimate effects of international exhibitions on trade and manufactures be what they may, it is evident that they enable us periodically to compare the technical education of the various countries of Europe with great facility, and whatever advantage any individual country may derive from this comparison, will be through the improvement of its technical or secondary education reflected in its trades and manufactures. The present Paris Exhibition has afforded even greater than the usual opportunities for such a comparison, and the peculiar position in which we are acknowledged to stand in several branches of manufacture depending for success on the intelligent co-operation of skilled workmen, has led many of the most far-seeing of our English jurors to consider seriously the subject of technical education in England. It may be, perhaps, cynically remarked that before we begin to meddle with the secondary education of our countrymen, it would be well to establish something like a decent system of primary education, so that every English child should receive as his birthright instruction in the simplest and most elementary knowledge;—that to offer instruction in science to people who cannot read or write is like offering jewelry to a naked man, or dainties to one who is perishing for want of bread. There is, we are prepared to allow, great force in this view of the case; but unhappily for us one great evil is not remedied, one important want is not provided for, by the omission from a sense of contrition of another obvious duty; or, in other words, upon the principle that two blacks do not make a white, bad primary education will not excuse bad secondary education; nor will the proved existence of a shameful neglect in the former relieve us from a responsibility to do something for the latter. We have been blundering long enough, Heaven knows, about sectarian and non-sectarian schools, denominational systems and national systems, frightening ourselves into religious panics concerning the precise theology which it is best to teach children of seven years and upwards, until, as a triumph of national foresight, there are more men and women unable to read and write in England, in proportion to the population, than in any other civilized country in Europe. This is a legacy bequeathed to us by our forefathers, for the existence of which we are not responsible, though we shall be for its continuance. It is a problem not approached in importance by any other question of the day, and one which of all duties it is our manifest business to attend to. There are signs of a recognition of the obvious necessity that exists for national action in the matter, for it is gradually resolving itself into a cry (and a cry which all political parties have used at different times), like the irrepressible Reform cry, and which all parties in the state will eventually have to agree about, to get it out of the way.

Meanwhile what is to be done in the matter of technical education? We have for many years advocated an extension of our present means of education in science and art, and the addition to them of new features on a much wider basis than exists at present. The opinions recently given by distinguished jurors of the Paris Exhibition, in reply to the inquiries of the Schools Inquiry Commission, betray to us what appears a practical unanimity of the best authorities in the opinion that we are losing ground fast and daily in our mechanical and manufacturing industries, and that this is to be attributed to the want of technical education in England,—education practical and theoretical in science and art. There is an almost singular similarity in the evidence on this point of such very different witnesses as Dr. Playfair, Mr. J. Fowler, and Mr. Huth. They all agree that what material advantages we have in England contributing to success in our manufactures, are more than counterbalanced by the great deficiency which exists in our manner of making use of them; and Mr. Huth, an extensive manufacturer at Huddersfield, a foreigner by birth, though an Englishman by everything else, boldly takes the bull by the horns, and says that we have the greatest difficulty even in maintaining our equality now, where we have for all past time ridiculed competition; and he attributes this change to the inferior education given to our "masters, foremen, and workmen," to that which is now given to all those classes in almost every country on the Continent of Europe. It is no longer, therefore, a question of whether we should or should not teach chemistry or drawing in evening classes, in the few towns such classes exist in, but whether some degree of instruction in science and art cannot become a feature of every educational school or institution. If the inferiority of our position is as much to be attributed to the ignorance of masters as to the unskilfulness of men, the colleges and grammar-schools are as much to blame as the National schools, the universities are as deficient as Mechanics' Institutes. We cannot much longer wilfully shut our eyes to the fact, that in consequence of the progress of invention, facilities of transmission, and rapidity of communication, a nation's prosperity depends more upon the use it can make of its scientific powers than upon anything else. The natural productive powers of a country may have at one time been the test and measure of its resources or its wealth, but it is so no longer. The skilful application of scientific inventions has more to do with a nation's prosperity at the present time than the possession of minerals under its share of the earth, or the quality of soil on its surface. How can we, therefore, ignore any longer the advantages and vital necessity of physics, as an integral part of all education? We do not cry out for the exclusion of Latin and Greek in our public schools, or the dead languages and the Scriptures at our grammar schools; but we do unhesitatingly say that other knowledge is now imperatively called for, besides these excellent subjects. Our eyes and our hands must be made intelligent and skilful, and our minds rendered capable of understanding common things in this scientific age, or we shall have to be content to take a very insignificant position for the future among the nations of the world. If, on the other hand, we could give the first rudiments of scientific knowledge to every school-boy, gentle or simple, making the first a possible manufacturer or merchant of enlightened views and far-seeing action, and the second a possible foreman or workman with ability to execute intelligently the designs of his master; and could give also in comprehensive Technical institutes the means whereby these school-sown seeds might grow into a well-developed and comprehensive knowledge of science or of art; then no fear need ever haunt us of being behind in the race for existence or prosperity; nor need we be subject to periodical panics concerning the maintenance of our manufacturing supremacy.

It required only the electric shock of evidence just now given to make us realise how very natural it is, after all, that we should be deficient in technical knowledge. Let us consider for a moment what are the means we possess of obtaining it. In the first place, we ought to know what is meant by the term, and then we may see more clearly our real position. Broadly it is what is usually spoken of as secondary education, though all secondary education is not necessarily technical. Instruction in art or science, in manufacturing processes, in the highest branches of ordinary trades, in the theory and construction of machines; in the history, theory, and practice of design; the application of design to various materials; the adaptation of scientific knowledge and artistic practice to the selection of beautiful forms in manufactures; their ornamentation; the analysis of systems, orders, and common features in the various objects in the various kingdoms of natural history, and their classification; the theories, uses, and applications, in civilized countries, of all the sciences; the practice of all art above the level of common manual labour;—these may all be said to be a part of technical education; and, if time and space permitted, we might go very much further and, by giving the detailed description of their general heads, show how education in these subjects ought to be the natural sequence of primary or general elementary instruction. General education is merely giving a man the power to study a profession or learn a trade: technical education will enable him to learn all that has been or can be done in his profession or trade outside of and beyond the pale of its ordinary practice; and all that is not merely mechanical or manual labour in either will come under the head of technical skill. Technical education stands as a connecting link between learning and labour, and, by uniting the two, confers what is necessary to all success, theory and practice, in their true relations of learning saving labour, and practice testing and rectifying theories.

From this definition, imperfect as it is, we can at least see that with the exception of medical or surgical instruction in hospitals, or private tuition in engineers' or architects' workshops and offices, technical education does not exist in England. Our schools of science and art aim at giving general rather than technical education; and the distribution of government assistance depends upon successful elementary instruction in the two subjects in schools both of art and science. Our universities ignore such subjects as these, regarding them as modern and comparatively trivial matters; our public schools have too direct a connexion with and are too much occupied in preparing pupils for the universities to lead them in paths which must be abandoned directly university life begins. Our private schools, in individual cases, do aim at laying a foundation for future technical knowledge by touching upon such subjects as mechanics, chemistry, botany, or drawing; but in almost all instances such subjects are purely

voluntary, are charged for as extras, and consequently limited to a few pupils. The only institutions which even nominally aim at giving instruction in technical subjects are the Mechanics' Institutes, and their efforts in this direction are more nominal than real. Mr. Fowler says in his reply to the Schools' Commission that they (Mechanics' Institutes) are more reading-clubs than anything else; but in this he is somewhat mistaken. Where they are most successful—as at Huddersfield and Bradford—their principal work is in remedying the defects, or supplying the place, of primary schools. In other places they become clubs, or associations for lending books and giving lectures on trivial or popular subjects. Where science classes exist in connexion with such institutes, their operation tends toward technical instruction; but the number of these classes is too insignificant to affect the question in its national aspect.

Our experiment of establishing science classes, and, in a few instances, schools of science, is of comparatively recent origin, and their organization is of too complex a character to allow of their becoming general. The same changeable regulations which have made the direction of the Science and Art Department vexatious to the schools of art, have also afflicted schools of science and science classes in mechanics' institutes; so much so that at a recent educational conference at the Society of Arts, presided over by the Right Hon. Mr. Bruce, the senior officer of the Society, Mr. H. H. Sales represented in his report that the connexion with the Science and Art Department of evening classes in his district had been found detrimental to their best interests, from the frivolous changes so constantly being made in the regulations of the department. Even with this disadvantage, the demand for technical instruction in England is really great, and a very large number of students offer themselves for examination every year in the more general subjects of science, under the auspices of the Society of Arts, as well as in the more limited and less popular examination of the Science and Art Department.

The Society of Arts, from which so much benefit to technical education has already proceeded, through the offer of prizes, the establishment of examinations, and its services generally as an initiator of local action, must be regarded more as a testing agent than as an educational one, though its work in that direction has been of great value. The extent of its operations may be judged of by perusing a recent number of the Journal of the Society, in which the report of Mr. Sales before referred to, as well as others, will be found recorded among the proceedings of the meeting over which Mr. Bruce presided. This, as well as other indications, serves to show that there exists among us not only the capacity for scientific culture, but the demand for it also, sufficiently positive to make the establishing upon a permanent basis of technical instruction, warranted as a compliance with the national requirements, its importance being of too serious a nature to leave it liable to interruption from purely local causes.

The operations of the Society of Arts, and the few schools and classes of the Science and Art Department, are valuable as indicating the existence of a want, and demonstrating the possibility, of success in secondary education; and they also serve to show how comparatively trifling have been all our efforts in that direction. The field is great, and the harvest is ripe for action; and the need is great also. We want the means for the instruction of hundreds of our professional men and skilled artizans where we now have it only for a few individuals, and the organization which shall be equal to the task of offering it to all who now do not even understand the meaning of technical education.

Is it therefore to be wondered at that we should be rapidly going to the rear in subjects requiring technical knowledge, if, as we have shown, it is so nearly impossible to obtain such knowledge in England? The wonder rather is that we should so long have retained a moderately respectable place in Europe; and we take it to be an indication of our capacity nationally for a much higher position than we now occupy, that in spite of such imposing difficulties we are not much worse than we really are.

Whilst we have been ignoring this matter, Continental nations have been studying it to some effect, and not only thinking about it, but acting upon their thoughts. Technical schools, with their practising workshops, their courses of lectures, their staffs of highly qualified professors, are general in the larger towns of France and Germany, and their influence is supplemented by public free libraries, museums, art galleries, technical collections, science laboratories, and art studios. There is not a town of half the population of Manchester, either in France or Germany, which has not better provision for adult education of all classes of the community in every branch of science and art, than London, or Edinburgh, or Dublin, or all of them put together. In France primary education invariably includes drawing, and technical instruction does also; so that you cannot find a Frenchman of decent position, or a tradesman of any kind, who is not able to draw to some extent. Ask a French or German artisan to describe a process he is working, or the intention of a work he is executing, and he will explain the whole matter in a clear manner, never stopping short in this direction or that for fear of getting out of his depth, but bringing knowledge of many outside or kindred subjects to illustrate his remarks. It is a common thing to see the man of science, and the workman in a blowse, sitting side by side, night after night, during the courses of free lectures given in the Technical Schools of France. For as in our hospitals the very best and widest experience is employed, an Abernethy, a Cooper, or a Paget, to attend on the helpless patient who pays nothing for such brilliant services, so in the French Technical Schools, as at Lyons, Toulouse, and Paris, the best men are employed to deliver free lectures in the public service, with the well-founded belief that good and profitable seed will be sown through their efforts, which eventually will bear fruit, and contribute to the national prosperity. Nor is this a new thing in those countries, though now more than ever cultivated and developed, for when we appeared to gain an advantage over our neighbours in the Exhibition of 1862, principally through our mechanical appliances, a definite movement was taken in this direction at once, and all that could be obtained from our experience in the sole subject in which technical practice was available for our artisans, mechanical engineering, was at once embodied more fully in their schools and free institutions.

How can we compete with people who act thus, unless we are prepared to very widely depart from our previous experience? Half measures will no longer suffice, and royal commissions issuing general suggestions addressed to the public which may never be acted on, will not provide the remedy so urgently required. Nor can we hope for much help from mechanics' institutes. Their very name implies the want of technical education, and this is precisely the only good thing that can be said in favour of their name. If we could get rid of so obviously a class name, and enlist all classes in their support by a general designation, such as Technical schools, then we might hope for the support of large numbers who now hold aloof from them, either from their charitable aspect, or from a feeling that they are only for one class of the community. Then, again, these institutes are generally managed by committees elected by members, who use the institutes for very dissimilar purposes, and when so elected they are not precisely the sort of men to manage great educational agencies. Voluntary management, and amateur direction, without any but purely accidental qualifications for the work, will not accomplish the establishment of a system of technical education; and for this we want no better proof than the present condition of the mechanics' institutes, which have attempted to do it and have failed. We require something more to be relied on as to qualification for the task of education, and promising more permanency than can be expected of purely voluntary efforts. It certainly might be attempted (if only the objectionable class-name could be got rid of) to make use of the organizations and buildings of the mechanics' institutes in the smaller towns as branches of more important centres in the larger towns, where complete and thoroughly organized systems of technical education could be carried out. Yet, it is quite possible that the institutes themselves may prefer to be the sole property of the class whose name they bear, rather than to become adapted to the requirements and new wants of society at large; and, if this be so, they must be left to their fate. If Dr. Birkbeck could co-operate in the movement which must sooner or later be made to remedy the deficiencies in education we have been describing, he would probably perceive the mistake made in giving the institutes he founded so narrow a name, thereby very much limiting their influence, and leading them by this limitation to grow entirely out of the objects for which he established them. There is some probability that this mistake may be remedied,—for, if we mistake not, the London Mechanics' Institute, established by him, no longer exists under that name, but continues and is developing its usefulness under a more general designation.

The true remedy, however, can only be effectually provided by the matter being taken up by Government, and thoroughly well considered plans being adopted for national action. In our primary schools, endowed grammar schools, and public schools, much may be done as preparation, and these are regions which Governmental action can effectually reach. In our universities professors should be appointed, and their lectures form an integral portion of the academical course, examinations in the theory and practice of some branches of science and art being a necessary part of the final test for a degree. Still more important would be the establishment at every provincial town in which an important trade or manufacture is carried on, of good Technical schools, with museums of art and industrial productions, as adjuncts to their class and lecture rooms, for educational purposes; and these should be managed upon a general plan, which would leave the direction of the studies in the hands of highly qualified professors, appointed by the Government, the museums and collections of educational, scientific, and artistic examples being branches of the South Kensington Museum, and the property of the nation. The theory of local government may be perfect in its application to lighting, and draining, and scavenging, though it will not bear too close a scrutiny even in these features, in practical working; but to initiate and control a system of technical education it is utterly unequal. The industrial prosperity of the country cannot, with any degree of wisdom, be left endangered, as the English jurors say it is at present, through the ignorance of all classes of society, and to rely upon everybody to remedy this deficiency is equivalent to relying upon nobody. Local agency and voluntary efforts will do little or nothing for us in this pass, and we shall have to help ourselves by the combined action of the whole nation, or drift farther behind than we are now. But it is not too late for us to take example from those Continental countries where the remedy for the evil we suffer from is already in successful operation. They do very much what we have now suggested, establishing technical schools as a national investment, and supporting them for the national profit, relying only upon local patronage to supply pupils and upon manufacturers to assist in their own elevation. It may be a chimerical view of a nation's duties, but, we confess, to us it appears as much an imperial duty to come to the rescue when its trades and manufactures are endangered by fair, though unequal foreign competition, as it is to defend them from invasions of another kind. The establishing of schools and museums at such places as Manchester, Glasgow, Birmingham, Sheffield, Leeds, Nottingham, Coventry, the Potteries, Worcester, the three capitals, and perhaps one or two other places, and maintaining them in a high degree of efficiency for ten years, would cost a good deal less than half as much as one of those floundering ironclads which appear to be superseded on an average about every six months by the invention of new targets or new guns. From an art point of view there is material enough at South Kensington to furnish all these towns with examples of industrial art with advantage to the present overcrowded museum. A year's work would suffice to obtain the materials for technical collections enough to commence with, and there are architects and engineers in England competent at any moment to co-operate in the direction of technical instruction. If we have not designs, we must do as Hunt & Roskell or the Messrs. Crossley, of Halifax, do, import them; but for men of science we need not leave our own island. Not that we anticipate the slightest difficulty in inaugurating and perfecting a complete scheme, or in its practical outworking, provided the nation can be made to see the necessity for a movement, and entrusts the organisation to the best men it can find,—responsible for its management and success, shielding them at the same time from the interference and meddling of incompetent committees.

Mr. Forster has suggested in the House of Commons that information concerning the

foreign technical schools could be obtained through our diplomatic representatives abroad, and doubtless much valuable information could be arrived at in this way. It will be a good discipline for us to know precisely how much has been done that we have left utterly undone, though we shall get very little more than tables of statistics or dry records of fact from the writers of despatches.

If a royal commission were appointed to inquire into the matter, or the powers of the Commission on Middle Class Schools extended for this purpose, we should probably arrive at better results than in any other way. The Commission which has elicited the very valuable opinions of the British jurors to which we have referred, has employed the most experienced inspectors of schools to make personal investigations into the conduct and management of the middle-class schools of England, and much information of the most valuable character has been thus obtained. We would suggest a similar action in regard to the technical schools of France and Germany. The visits and personal examinations, with full reports of a few distinguished men of science and of art, to the best Continental schools, would give us information such as we want, differing as much from the sort of facts we shall get from our foreign diplomatic representatives, as a living man does from a dissected subject. We want not only the facts, but the life; not only the bare statements, but the full details of operation in practice; and to get this we must employ men capable of understanding the processes of education, and with experience enough to detect those features of it which are successful. Something also may be obtained from records of system, appliances, and methods of instruction which diplomatists will not be the best persons to note; and it will require something more than a faculty of annotating facts, or speaking in guarded language, to present this information to us in a way that will be serviceable to the cause of technical education in England. A knowledge of manufacturing processes, of much and varied technical knowledge, ought also to be possessed by those who examine for us the conduct and operation of technical education, including some experience of the trades which may be affected through the inquiry.

Nevertheless, whatever we do in this matter will be a step onwards, though much will depend upon the way we go about the task, whether it be the first of many steps, or result in a short-lived effort of no permanent benefit. We believe that if the attention of Parliament can be effectually drawn to the subject before the dissolution, which appears likely, takes place, so that an investigation be commenced previously to the closing of the Paris Exhibition, our operations will be facilitated, and many opportunities now offering will be made use of. It is a subject of some importance nationally, and we shall not be maintaining the character of a practical people, of which we are so rightly proud, if we do not strain every nerve to obtain some practical advantage from its consideration.

A MEDICAL AND LEGAL OPINION OF THE NEW SANITARY ACT.*

AN Act of Parliament has disadvantages. One of these drawbacks consists in the fact that it is not placed in our hands on approbation, or on a month's trial, nor can its framers make any trial of its capacities themselves before issuing it to the world. It comes before us, drawn up, doubtless, with grave consideration by able men, but still untried: the first strain reveals flaws here and there that it is too late to remove, but which would have been carefully strengthened had it been foreseen that the particular pressure would have been applied to which they gave way. The new Sanitary Act is no exception to this disadvantage. The conventional carriage-and-four can be driven through it in various places; and the particular breaches through which the figurative vehicle can be dexterously guided have not been difficult to find. The principal cause of this weakness is, that the Act is not sufficiently imperative in its terms and binding in its obligations. Much that should be obligatory on all authorities is left a matter of choice.

We have before us a work of twin authorship, on sanitary reform, which points out the shortcomings of the Act. Dr. Stewart, looking at the question from a medical point of view, deplores, as others have done, the non-appointment of permanent officers of health in every town as a means of systematising the enforcement of sanitary regulations; and Mr. Jenkins, looking at it from a legal point of view, puts his finger on the particular passages which stand most in need of revision to render the provisions of the Act effective. Out of fifty-nine towns, concerning which Dr. Stewart has been able to gather information from reliable sources, eighteen only can boast the delegation of the care of the public health to a responsible officer. Notwithstanding the great accumulations of proof that many diseases are preventible, only eighteen towns out of those fifty-nine have appointed an officer to see that the causes of needless loss of life are not in operation. Looking at Dr. Stewart's concern for this apathy or negligence, we see one great generous stride already made. The celebrated physician, Dr. Cheyne, wrote in his preface to his "Essay on Health and Long Life,"—"If it were possible any set of men could be offended at my performance, it might be my brethren of the profession, for endeavouring to lessen the *materia morbifica*." Now-a-days, many brethren of the profession are enthusiastic workers under the banner on which is inscribed "prevention is better than cure." It is re-assuring, too, to mark the certain steady progress made in the extended view of the conditions that maintain health. In Dr. Cheyne's day, when the Pretender, Sir George Byng, the South Sea Bubble, and Siege of Gibraltar occupied men's thoughts, regimen was considered to be the grand source both of health and disease. Nothing, if we except a recommendation to choose the side of a small eminence on a gravelly soil with a southern aspect, remote from any great concourse of waters or mines, for the site of a house, was deemed by him of much importance as the means of preserving health, but regimen. Sir Charles Scarborough's advice to the gay Duchess of Portsmouth was always in his mind as well as upon his page:—"You must eat less, or use more exercise, or take physic, or be sick." His theory was that the human frame was like a large vessel with only a small inlet and outlet, to cleanse which it was imperative to pour in a thin clear fluid and give it a good shaking. No lazy person, according to him, was ever a long liver, unless he had an original constitution of brass; nor did a hearty eater ever see length of days. "The Grand Secret," he wrote over and over again, with a profusion of capital letters, "the Grand Secret and Sole Mean of Long Life, is To keep the Blood and Juices in a due State of Thinness and Fluidity, whereby they may be able to make those Rounds and Circulations through the animal Fibres, wherein Life and Health consist, with the fewest Rubs and least Resistance that may be. In spite of all we can do, Time and Age will fix and stiffen our solids." But he had a prescription with which to combat age. This was regimen again. Abstemiousness was his sovereign cure. He tells us Cornaro lived to be a hundred years old by virtue of temperance all his life and great abstemiousness in his latter days, when the yolk of an egg was sufficient nourishment for him for three days. And Sir William Temple's measurement of wine was Dr. Cheyne's admiration. It is a hundred and forty-five years ago since he wrote, "It may be sufficient for those who are tender, studious, or contemplative, to drink three glasses of water with a spoonful of wine at the great meal. And, as Sir W. Temple has it, "One for yourself, another for your friends, a third for good humour, and a fourth for your enemies, are more than sufficient after it." He saw no sanitary reform needed except in the manners of eating and drinking. His monster nuisance was PUNCH, as he printed it. It was punch that made the fortune of Bath, for it was that "heathenish liquor" that sent the crowds of debilitated, tabid, Indian nabobs to drink its waters. In fine, in Dr. Cheyne's day, the public health was a matter of individual management and not suspected of being amenable to any general laws. Five-and-twenty years after his essay was penned a new light arose in the person of Dr. Lucas, an Irish physician, who was a prominent member of the Irish Parliament. He was an ardent politician, and frequently confused the political and physical health of the community. His energetic asperity overflows in his "Essay on Waters," where he hints that the Bath doctors are strongly opposed to him. After belabouring his opponents and critics, and hoping the galled jades will wince, he unfolds his scheme of preserving the public health. This is also a personal and individual proposal, for it consists in bathing and drinking water. He took great pains to test the waters of the Thames, the New River, Hampstead, Rathbone-place; and the public pumps at Aldgate; in St. Paul's Church-yard; in Hare-court, in the Temple; in Swan-yard, in the Strand; in the Savoy; in Covent Garden Market; at the Banqueting House, Whitehall; St. Margaret's Church-yard, Westminster; as well as the springs of Lamb's Conduit, Crowder's Well, and Postern-rowe; and though he discovered the presence of foreign matters in various proportions, he gives no hint of the possibility of percolations having an injurious effect upon the persons habitually drinking them. So that they drank plenty of water, it mattered not, it seems, whence the source. Neither fever, consumption, nor gout could make any stand before water. Beginning with melancholy madness, indeed, he runs through a long list of chronic and acute diseases that are only so many sighs made by the constitution for copious draughts of water. Rain-water is to be preferred for the miserable mania just mentioned, but any kind of cold water answers for ordinary complaints. Should any perverse constitution receive no benefit from this prescription, there remains the alternative of warming the water. Not a thought about surrounding conditions,—not a suspicion that any disease-creating agent was at work that was not encased in the patient's frame. Twelve years after Dr. Lucas had dedicated the work in which he set forth his idea of the source of health, in pungent as well as fulsome terms, to "His Royal Highness the Prince," afterwards George III., Sir John Pringle published his admirable "Observations on the Diseases of the Army," in which he seems to have forestalled much of our experience. This eminent physician studied at Leyden, under Boerhave and Van Swieten, and was physician-general to the forces abroad till the peace of Aix-la-Chapelle, when he was appointed physician to the queen's household, and president of the Royal Society. Dr. Stewart aptly quotes, as a commencement to a retrospect of what has been done in sanitary reform, one of his most prescient passages, which we also transcribe, as it shows a remarkable awakening to the serious consequences of external surrounding objects upon health, so completely unrecognized by fashionable physicians of the reigns of George I. and George II.:—

"From this view of the causes of malignant fevers and fluxes it is easy to conceive how incident they must be, not only to all marshy countries after hot seasons, but to all populous cities, low and ill-aired, unprovided with common sewers, or where the streets are narrow and foul, or the houses dirty; where fresh water is scarce; where gaols and hospitals are crowded and not ventilated, or kept clean; where, in sickly times, the burials are within the walls, and the bodies not laid deep; where slaughter-houses are likewise within the walls, or where dead animals and offal are left to rot in the kennels or on dung-hills; where drains are not provided to carry off any large body of stagnating or corrupted water in the neighbourhood; where flesh meats make the greatest part of the diet, without a proper mixture of bread, greens, wine, or other fermented liquors; where the grain is old and mouldy, or has been damaged by a wet season, or where the fibres are relaxed by immoderate warm bathing. I say, in proportion to the number of these or the like causes concurring, a city will be, more or less, subject to pestilential diseases, or to receive the leaven of a true plague when brought into it by merchandise.'

Here, at the very commencement of the long reign of George III., we have several of the most vital sanitary requisites perceived, and the most deadly causes of disease exposed. Modern experience has added a few more items to the list, but not very many. For a hundred years the great family of mankind has been warned that certain conditions will cause the premature death of a great many members of it; and very little notice has been taken of the intimation till the occurrence of fearful epidemics draws temporary attention to the truth of the warning. This habit of indifference has led a continental philosopher, Hecker, to frame the theory "that great epidemics are epochs of development, wherein the mental energies of mankind are exerted in every direction." Would that it would also lead to the organization of competitive examinations of the management and conditions of our towns. We have seen merchandise from all corners of the earth coming to one common centre for examination, praise, and prizes: let us hope that the progress of a peripatetic jury from city to city, to examine and select for royal praise and prizes, and the concourse of sovereigns, perfection in sanitary arrangements

* The Medical and Legal Aspects of Sanitary Reform. By Alexander P. Stewart, M.D., and Edward Jenkins, Barrister-at-law. London: Robert Hardwicke, Piccadilly. 1867.

made for the good of the community, is not beyond the limits of possibility.

Let us see what enactments have been made. Though sanitary legislation has been "timid and apologetic," it has been in advance of the national appreciation of the importance of the subject since the cholera epidemic in 1832, bearing upon the public health. In 1834, boys were prohibited from sweeping chimneys; in 1840 and 1841, the practice of vaccination was extended by law; and in 1842, the employment of women and children in mines and collieries was declared illegal; in 1846, the establishment of baths and washhouses was promoted; in 1847, the Towns Improvement Act was passed; in 1848, followed the Public Health, the Nuisances Removal, and the City of London Sewers Acts; in 1850, the Metropolitan Interment Act paved the way for another which applied to the whole of England in 1853; in 1851, there were the Acts to Encourage the Establishment of Lodging-houses for the Labouring Classes and the Common Lodging-houses Act; in 1852 the Metropolitan Water Act was passed; in 1853, the Smoke Nuisance Abatement (Metropolis) Act and the Act to Extend and Make Compulsory the Practice of Vaccination were added to our statutes; in 1854, the Merchant Shipping Act, protecting the health of the seamen, was passed; in 1855, the Diseases Prevention, the Metropolis Local Management, the Metropolitan Building, and the Nuisances Removal Amendment Acts were made; and in 1858 the Public Health Act abolished the powers of the General Board of Health, and vested them in the Privy Council. Since this transition was effected, 1858 and 1866 saw two new statutes for the purification of the Thames; 1860, the Nuisances Removal Amendment Act and the Act for preventing the adulteration of articles of food; 1860-61-64, Acts relating to the women and children employed in bleaching and dyeing works, in lace factories, potteries, and manufactories of lucifer matches, percussion caps and cartridges, in paper-staining and fustian cutting; 1861, a further amendment of the Vaccination Act; 1863, the Act for the Seizure of Diseased and Unwholesome Meat, and the Alkali Works Act; 1865, the Sewage Utilization Act; and, lastly, 1866, saw the Labouring Classes' Dwelling-houses Act and the Sanitary Act passed. All these Acts have had some influence for good, and most of them would have had more if they had been more stringently binding, and less full of loopholes through which the unwilling to comply with their terms barefacedly escape. An Act of Parliament should be more than a suggestion or a permission: in sanitary matters it should be an explicit explanation of what should be done in its various branches, an injunction to comply with these terms, besides a schedule of the penalties for evasion and other forms of non-compliance. As Dr. Cheyne would say, the grand secret of the weakness of the Sanitary Act is that it is content to suggest as frequently as it is to insist. Dr. Stewart has filed a string of instances in which refractory local authorities have adopted one Act so as to evade another, and have bearded the central authority or Health Department of the Privy Council with decisions to take no sanative steps. He has, perhaps, been still more usefully employed in drawing up the following statement as to what is yet imperatively required, which we quote as a modern filling up of the sketch made by the Queen's physician, Sir John Pringle, in the beginning of the reign of her Majesty's grandfather.

1. We require a thoroughly efficient administrative department of government for the superintendence of all matters relating to the public health, and the enforcement of the law on recusant local authorities.

2. The appointment of officers of health, not only in towns, but in the country, and for our ports and harbours, should be compulsory; they should be independent of the local authority, their appointment, the amount of their salary, and their dismissal being subject to the approval of the central department, and should exercise a general supervision of such districts as may be agreed upon.

3. The inspectors of nuisances should always be under the control of the officers of health, and should not be burdened with other and inconsistent duties. Their appointment should in every case be compulsory.

4. There should be an annual return to Parliament of all officers of health and inspectors of nuisances, of the population and areas of their respective districts, of the salaries paid to them, and of the duties they are required to discharge.

5. As a general rule the officers of health should be specially trained and set apart for that work alone, and be remunerated accordingly, out of the municipal funds or county rates, aided from the consolidated fund.

6. The isolation of those sick of infectious disorders should be enforced by their early removal to—

7. District hospitals or refuges to be provided by the local authorities.

8. The conveyance of such cases in hackney carriages should be everywhere prohibited under a penalty, the same to be strictly enforced against offenders.

9. Carriages for the conveyance of such cases must be provided by the local authorities.

10. Disinfecting apparatus for clothes and bedding must likewise be provided by the local authorities.

11. We urgently need a well-considered Act, which shall facilitate the acquisition of low house property, and shall empower the Government to grant loans on easy terms, on the security of the new buildings, to those who shall undertake to provide wholesome dwellings for the labouring population.

12. The supply of gas and water should be taken out of the hands of private companies, and entrusted to public and responsible bodies in the interest of the consumer.

13. It should be made lawful for Boards of Guardians to apply a portion of the rates to the providing of convalescent accommodation for those who require but cannot procure it.

14. A strict Government inspector should be made during the progress of all works, for the execution of which the Government sanctions the borrowing of money, and before instalments are sanctioned, the inspector's reports and certificates being published.

Mr. Jenkins finds the most obvious deficiency in the new Act to be the absence of a central supervising power, which he would not confound with a central administration. Local authorities should be free to act, but still be under the supervision of a superior court: in other words, more coercion over local authorities is required. A district visitation of cholera, if unchecked, soon becomes a general one. It is, therefore, a matter of the first moment that the authorities of the place in which it first appears should be amenable to some central power should they fail to take remedial steps. We would here remark that a great deal has been said about the apathy and opposition of local authorities without the true source of the resistance being hinted at. The grand secret of the inactivity of the local authorities is, that they are formed of bodies of picked men, annually, or biennially, or triennially elected by the ratepayers out of the rest of their fellow-townsmen as men who are able and likely to resist any proposal that involves any addition to the rates. Until the ratepayers are brought to their senses, and have their eyes opened to the importance of leaving not a stone unturned to lessen every individual's chance of sickness and premature death, we fear this class of men will continue to be returned. In country unions the farming interest is largely represented in the board of guardians; and, as the rates fall heavily on the farmers, it is, perhaps, too much to expect that they should be so public-spirited and generous as to charge themselves with expenses from which they will derive personally but little benefit, as their own residences are not situated in towns. And where a local board of health is in existence, or a council charged with town improvements, it is often very much pervaded by the sentiments of the board of guardians. The chairman of one is sometimes the chairman of both; the members often sit upon both boards; and, of course, the electors are identical. It is, then, the electors, or ratepayers, who are the real authors of the resistance met with. It is they, as well as their representative men, to whom the apostles of sanitary reform must preach.

Members of water and gas companies are often members of boards of health, and in that position are more likely to be the defenders of their company than their accusers, should complaints be made,—another instance that shows the desirability of an officer whose sympathies and property are locally unaffected. Such ratepayers as are in favour of reform in these matters should exert themselves to be more faithfully represented. Mr. Jenkins says, with compulsory enactments, and an efficient ministry or board of health, we might see some prospect of the sanitary regeneration of the country. We say more. There should be a college in which sanitary officers are trained, or a department should be made for them in some college, already existing, such as Sandhurst. Their appointments to towns should be for fixed periods, when they should be removed to another, the young officers beginning with small towns and graduating to large cities. A man permanently fixed in one locality gradually becomes bound hand and foot with sympathies with this or that inhabitant, fear of offending some, and wish to please others, just as a stone not belonging to the seashore gradually gets covered with seaweeds and limpets if left there long enough. The emoluments should be sufficient to preclude the necessity of private practice, which should be prohibited.

In April last a deputation waited upon the Duke of Marlborough with a memorial from the Council of the National Association for the Promotion of Social Science, submitting for the favourable consideration of the Government four statements:—

"1st. That the laws of public health require to be revised and consolidated with plain and specific enactments on sanitary matters.

2nd. That permissive enactments are generally taken to be permissions not to act, and that therefore the most useful provisions should be made peremptory.

3rd. That the constitution of sanitary authorities should be more uniform; their areas of administration more extensive; their powers and functions more comprehensive; and that some provision be made for the addition of members possessing other and higher qualifications than those now required.

4th. That the inefficiency in the administration in the health laws by the local authorities is in part due to the absence of a central power, which could be appealed to without reference to the courts of law, and could by means of judicious advice, and, if necessary, by legal compulsion, cause the local authorities to do their duty."

The Duke expressed a wish to be furnished with a digest of the remarks made by some of the gentlemen forming the deputation, which has been drawn up. Mr. Jenkins gives this valuable pith. Mr. Rendle, secretary of the Health Department of the Association, alluded to the fragmentary and contradictory character of past sanitary legislation, and the need of a better organisation; an adjustment of the duties of magistrates, whose police duties he deemed little in harmony with sanitary legislation; an amended Building Act, in which there should be provisions under which healthy habitations for the poor might be rebuilt on sites where unfit dwellings were pulled down under any Artisans' Dwelling Bill; and an alteration in the administration of the Vaccination Act, which is now, pauper-like, in the hands of the Poor-law authorities, whose appointed officer not only vaccinates, but certifies to the success of his own operation. Mr. Rumsey laid fresh fagots on this pile. He urged the consolidation of the duties now divided between the Privy Council, the Home Office, the Poor Law Board, and the Registrar-General; pointed out the anomalies which mark the administration of boards existing under Poor Law, Local Government, and Public Health Acts; the difference of area and population in the districts under these boards; recommended higher qualifications for their members, and the extension of areas of local government, with the appointment of a scientific officer to correct and verify the great facts of disease and mortality, and apply them to the suggestion of practical remedies. Dr. Lankester brought forward more fuel. What he found wanting was a unification of the laws relating to public health. In the present state of things it was a most difficult thing for an officer of health, in the parishes of London, to know to what authority to look when he wished to abate or prevent nuisances injurious to health; and that the present apportionment of control or power was not of avail he would instance in the fact of the failure of the Vaccination Act as at present administered, 2,000 persons having died of small-pox last year. Mr. James Beale heaped up the pile behind which it is to be hoped all obstructions and objections will ultimately disappear. He, too, asked for unity: either of the present departments of government would answer with extended powers; but not all three, as they only made confusion. As an instance of this weakness he complained that the Sanitary Act of 1866 imposed upon vestries the duty of providing hospitals for infectious diseases, and that this year the Poor Law Board passed through the House a bill to impose this duty on boards of guardians, and that certain regulations approved by Mr. Walpole for Chelsea were disapproved by him for St. James's. His leading suggestion was that all the health bills and vaccination Acts should be handed over to a draughtsman to consolidate and unravel. Dr. Stewart put the apex to these legal and medical opinions of the short-comings of sanitary legislature in the same propositions we have mentioned as laid down in his work. All these testimonies go into the same scale. The medical men agree that a scientific officer should have the charge of the public health in every union, and that the inspector of nuisances should always be part of his staff or under his control; and the legal authorities urge that this large body of men, so appointed, should be all in communication with and under the supervision of a central board of health service; and that all the sanitary laws in existence should be compared, reconciled with one another, condensed, and all the most useful provisions made compulsory instead of optional.

Both Dr. Stewart and Mr. Jenkins have been well employed, and neither has ventured out of his depth. The practical or constructional engineering departments of sanitary reform they have

not touched upon. We have personally a quarrel with them: in their review of the efforts early made in the cause of sanitary reform they omit all reference to the continuous labours of the *Builder* in that direction at a time when many to whom they refer as workers had not learned the importance of the subject. This, however, gives us little concern. We are contented to see that what we have striven for during long years is being achieved bit by bit; and, having no selfish motive, we shall not be led to relax in our endeavours though others may be taking the credit of much of what we have done.

THE CONSTRUCTION OF GUNS.

IF it were possible for the human ear to distinguish the varied sounds that combine in the constant roar of life ascending from the great centres of population, and to trace to its origin each order and species of sound, we should be startled with the strange and incessant activity of one special metallic note. Through all the din caused by the exercise of the arts of peace would be heard the sharp ring with which the armourers' hammers,

> "Closing rivets up,
> Give dreadful note of preparation."

In every arsenal, in every manufactory of small arms, men are working against time. Sixty thousand Chassepot rifles, we are told, are nearly ready for issue to the French army. Prussia is turning out a new needle-gun. Austria is converting her weapons into breech-loaders. Russia is preparing 600,000 of these new weapons. If the *vis pacem* follow as a matter of course on *para bellum*, never was Europe so busily employed in preparing for perpetual peace.

It will be to but little purpose that we are made aware of the activity of the gunsmith among our neighbours, or that we shall be told that the ruler of a neighbouring country, who has never forgotten that the great soldier whose name he bears was an officer of artillery, has been preparing a surprise for the world in the perfection of that most serviceable of all weapons, a two-pounder gun, if we fail to cast a sharp glance on our own workshops. A conversation took place not long ago in the House of Commons, the great importance of which has been lost sight of amid the clash of party warfare, and the claims of the "compound householder." We trust that our readers will not have forgotten the name of Mr. Snider. Believers in ghosts may feel assured that the shade of that ill-used and meritorious inventor has been, to some small extent, avenged. It comes out that "the Department," betaking itself with military promptitude to make the best of the prey secured for it by its legal advisers, has made more haste than good speed. Acting on the usual principle of deferring change to the last moment, and then being driven into an inconsiderate hurry that deprives the change of much of its value, the War-office, or their officers, have managed so to convert or so to load the rifles dealt with on the Snider principle, as to cause wild firing, and to place our troops who were dependent on the new arm in a position to suffer affront, or worse disaster, if they had come into action. Of course, all is now set right, or will be so to-morrow or next day. It is always so when inconvenient questions are asked. But the point of the case lies here. Great Britain spends annually a large sum for her defences; she does not grudge her millions for the purpose. She has more hesitation in finding men; her sons take to a red coat with less readiness than do those of some of her poorer neighbours. What the country has the right to demand is, that the army and navy estimates shall be so spent that our small and precious army shall have the best military instruction and the best arms and ammunition that practical science can supply. At present it is far from having either the one or the other, and public attention cannot be too loudly called to the fact.

It must be candidly admitted that the duty of a military administration, during a time of scientific revolution such as that of the last ten years, is neither simple nor easy. Time enters so intimately into all questions of safety,—the possible enemy may not choose to wait till we are ready to receive him. If the question of the best weapon cannot be solved *impromptu*, but has to wait the proof, or the improvement, that can only be given by repeated experiment, we are none the less bound to be provided with the best weapon known. There are, therefore, two requisites equally important to be borne in mind by a Minister of War and his advisers. One is to have readily and promptly under hand the best known and proved weapons; the other is, patiently and cautiously to take the advice of the most experienced and able mechanics, and steadily to prosecute experiment on the value of projected improvements. It can, perhaps, hardly be expected that a Secretary of State, or a Commander-in-Chief, in the present generation, should master the simple outlines of the scientific problem, see clearly what ordnance ought to be, and thus distinguish between that experiment which forms the pathway of practical science and that which is merely empirical. But the more fully a statesman is aware of the nature of the problem which involves the efficiency of the national defence, the more earnestly will he insist on the two points we have named—full supply of proved weapons, and careful inquiry as to the capacity of better ones.

The whole history of our recent improvements in small arms and in artillery, as well as the record of the military events of the last five years, bears out the above assertion. Precision has been introduced as an element of gunnery—precision so different from that attempted in the wars of the early part of the century, that it appears as a new feature of construction. To arrive at once at the best weapon was, of course, out of the question. To remain content with an inferior one, while other nations were re-arming, would have been treason. Hence we have had, and that wisely and properly, the Enfield rifle of 1853, the Lancaster gun of 1850, the Armstrong gun of 1858, and the Snider breech-loader of 1866. No less certain is it that the scientific problem, whether or no it be yet solved, is not taken for the main requisite of our theory of defence. We have fair rifles, fair cannon, rifled on different systems, and formidable projectiles. But we have no system of artillery. Nor have we in the service either the best rifles or the best cannon known and proved to be in existence.

The progress of science, in any individual branch, is far from being always equable and maintained. There are periods of long stagnation, when some new principle awaits disclosure. There are periods when, like the planets themselves, Science seems to retrograde in her course, collecting, it may be, force for a new leap into the unknown. The discovery of some new truth may impel thought in a wrong direction, until the counterbalancing principles be also discovered. Thus, to confine ourselves to the subject of artillery, so late as the year 1863 we find a disposition evinced to return to the use of the old 68-pounder smooth-bore gun; and the frank admission of the First Lord of the Admiralty, after the enormous expenditure incurred for the improvement of our ordnance, that when asked what gun he approved for the navy, he was obliged to say that he "really did not know."

When, however, we find that the advance of scientific detail is in accordance with the historic progress of the question under investigation, we have a sure indication that the movement taking place is in the right direction. If we apply this principle to the case of artillery, we shall find that it gives valuable light. The history of offensive warfare is, scientifically regarded, the history of projectiles. The earliest instinct of self-defence among men is to make use of a missile. So completely is this the case, that it is acknowledged by the instinct of the animal creation. A dog fears, to a certain extent, a stick; but it is only when he sees it. Make believe to provide yourself with a stick, and the dog is not imposed on; but only stoop, pretend to pick up a stone, and the dog does not stop to reason on the probability of your finding one at hand,—he makes off before the first indication of recourse to the simple weapon from which he can least readily protect himself. Thus, especially in defence from siege, stones of all sizes were the ammunition of primitive warfare. And thus the first purely warlike weapon (whether for the chase, which is the war with brutes, or for the battle, which is war with men) was a means of propelling stones. The first means of distant offence was the sling. Great accuracy and power were attained by this simple weapon; it ranks high in military history; and its disuse, on the introduction of a more formidable weapon, was not because the bow was so much better than the sling or the catapult, but because arrows, to which a sustained flight would be imparted by attention to their feathering, were so much better projectiles than stones, or even than leaden bullets.

The invention of gunpowder drove arrows from the field. It was rather from the power of powder to project masses immoveable by less forcible means, than from increased excellence of shooting, and also from the greater portability, and greater ease of manufacturing the new missiles, that the clumsy match-lock and the not very much more precise musket came to supersede the well-tried yew. The explosive system, as a whole, drove out the elastic system, as a whole, by the great superiority of the former as to the heavier artillery. As to the small arms, the question is more open. The bayonet may have had more to do with this than the bullet. The battle of Waterloo was the most terrible, as to the ravages of cannon, known in our history up to 1815; but, if we compare the results of the musketry in that critical encounter with those of the arrow flights at Crecy or at Agincourt, it is not so clear that the bullet, with all the advantage it derived from explosive propulsion, equalled as a projectile the cloth-yard shaft. In matter of precision, if not of range, the former seems to have been certainly the inferior.

Now, the increased precision of modern arms follows from the attempt to give to the bullet one main characteristic of the arrow. Instead of merely blowing a ball from the mouth of an intensified pea-shooter, such as the old smooth-bore musket, the rifle gave a spin to the projectile, which thus was enabled to sustain a more regular flight. To ensure the spin the bullet was, in the Minié and other early rifles, lengthened from a spherical to a conoidal form. But no actual investigation into the best proportions between diameter and length of bullet, or into the relation between the rapidity of spin to be given to the projectile, and the range through which it was to be propelled, appears to have been systematically attempted before the experiments of Mr. Whitworth. That eminent mechanician was certainly one of the first practically to grasp the truth that the first point in offensive science was to determine the best form of projectile, and that from this was to be deduced the best form of projecting weapon. Equally important, although a perfectly distinct subject of investigation from the question of form, is that of the nature of the best material to be employed, whether for bullet or for gun. The third element,—the nature of the projectile force,—does not at this time require investigation, from the fact that the question is not how to increase, but how to manage, the explosive power of gunpowder. So long as the powder is stronger than the gun, it is the weaker portion of the destructive machinery that demands the first attention of science.

Avoiding any minuteness of detail, it appears that the result of systematic and exhaustive experiments established the best form of projectile, a form which mathematical science might perhaps have predicted, but which positive knowledge owes to Mr. Whitworth. A bolt, some three times longer than its diameter, and with a twist around its axis four times more rapid than that which the Enfield rifle was calculated to impart to its leaden projectile, flat-headed, when destined to penetrate hard bodies, and tapered behind, to diminish the resistence of the atmosphere, such was the last step in the series of missiles that commenced with the smooth pebbles of the shepherd's scrip.

The barrel is the reciprocal of the bolt. The form arrived at as the result of Mr. Whitworth's experiments, in which the means of accurate mechanical manufacture were considered as thoroughly as the question of projection, was a twisted hexagonoidal tube. Shot and barrel are capable of being so turned out of hand that, if the former be sent home by the ramrod, the touch-hole being stopped with the finger, the elasticity of the condensed air is sufficient to return the bullet towards the muzzle as the ramrod is withdrawn. Greater windage is allowed in practice; but the perfect freedom of the system from tendency to jam or to rack is shown very distinctly by so delicate an experiment.

With this form of bolt, and with this form of barrel, projectiles of every diameter, from the ½-in. of the small bore rifle to the 5½-in. of the 70-pounders actually tried, or to the still larger calibres of our future guns, attain the widest range, and the greatest accuracy as yet known to be possible. In the experiments conducted at Shoeburyness in 1864 and 1865 between the breech-loading Armstrong 12-pounder, the muzzle-loading Armstrong 12-pounder, and the Whitworth 12-pounder, the committee report

that the range of the latter gun was 29 per cent. superior to that of the two former; the Whitworth projectile, fired at an elevation of 33°, attaining the distance (in the mean of nine shots) of 8,776 yards, against the respective distances of 6,788 and 6,774 gained by the competing bullets. For accuracy the superiority of the Whitworth ranges from 17 per cent. above the Armstrong muzzle-loader up to 900 yards, to 100 per cent. above it from 3,000 to 3,600 yards; the muzzle-loading Armstrong, in its turn, being from 25 to 48 per cent. superior to the breech-loading Armstrong. This result is derived from comparative trials with solid shot. As to shell and case, the question of the comparative projectile value of the different patterns brought forward for experiment is more complicated, and it is by the comparison of the same kind of projectile alone that accurate results can be obtained, no element of disturbance entering the case when solid shot are employed in each weapon.

In the trial of the 70-pounder guns, as reported on by the same committee, the figures are no less eloquent as to the incontestable superiority of the Whitworth system. At elevations varying from 0° to 21°, the range of the 70-pounder Whitworth exceeds that of the muzzle-loader Armstrong by ratios increasing with the angle of from 5 to 26 per cent., reaching a mean distance, in eighteen rounds of 7,965 yards, against 6,330 yards covered by the muzzle-loading, and 5,821 by the breech-loading Armstrong. The mean radial error of the Whitworth, at this range of four miles and a half, was 65·8 yards, that of the Armstrong guns being respectively 116·2 and 123·3. Penetration, tested by firing against a solid mass of brickwork, 40 ft. thick, at a distance of 750 yards, was 7·25 ft. made by the Whitworth solid shot for 4·75 ft. made by the muzzle-loading Armstrong.

When it is remembered that these results are due to the employment of the same system which, in 1857, produced a rifle that beat the Government arm more than three to one, planting the average of its shots, at a range of 800 yards, within a circle of 4½ in. mean radius, against an area of 27 in. mean radius in the other, it seems to us that there can be no room to hesitate as to the system on which the British army and navy ought to be armed. In availing themselves of the services of Sir W. Armstrong for the development of his own weapon, the Government of the day, no doubt, exercised a wise discretion. Whether after having so far departed from the time-honoured routine, as to take the advice of an eminent civilian, on a subject on which he was at home, and military men were inexperienced, the Government went rather too far, it is now scarcely necessary to inquire. In all cases of the kind the sage maxim "*Cuique in suâ arte credendum*" cannot be neglected without misfortune. For the War-office and for the Navy to avail themselves of the best civil professional advice in such matters as the manufacture of firearms, is a duty so obvious that it seems useless to insist on it. The only danger lies in the exclusive reliance on one adviser and one system, when there there is a fair question to be settled among competitive weapons. But when, on the one hand, are various systems, each more or less undergoing constant modification, for small arms, field guns, and heavy cannon, contrasted with, on the other hand, one comprehensive plan, slowly matured from exhaustive experiment, and resulting in an undisguisable triumph against every competitor, though in many respects hardly fairly tested against rival weapons already bearing the *prestige* of "the Service," the minister who hesitates to take council of the engineer who has so far demonstrated the soundness of his views incurs a very heavy responsibility in the face of the country.

We have spoken hitherto of the forms of projectiles, and of the corresponding form of the projecting arm. Another question remains untouched—that of the material. The two are so far distinct that the best results might be attained in either case by different experimenters. There is no reason why the man who finds out the best form of gun should also be the discoverer of the best material from which to make it. The question before discussed may be considered as ground common to the mathematician and to the practical experimenter. The question of material is one for experiment alone. Chemistry, which here replaces geometric or algebraic investigation, is exclusively an experimental science. She knows, as yet, nothing whatever of "the high *à priori* road," or rather it is by her departure from that old-fashioned and devious track that she has entered so closely into the secrets of the great Architect of Nature. The state of this part of the case is, at present, that the force of gunpowder is so great that no known material enables us fully to utilise it. Any gun can be burst by repeated efforts. The gun will not have attained its proper relation to the powder consumed in its barrel until it is made of a material which a full charge of powder can neither burst nor stretch.

The cohesive quality of iron, as at present manipulated, is below this requirement. Ordinary cast-iron, the readiest material for the construction of large guns, has to be altogether laid aside for the future. It cannot resist the heavy charges of powder, and the increased force of the explosive power due to the retention of the projectile by the rifling of the barrel. It has been attempted to meet this difficulty by several methods, the most successful of which have been respectively and interchangeably adopted by Sir W. Armstrong and by Mr. Whitworth. Sir William and Captain Blakely (for in this as in most instances of the independent discovery of nearly identical methods the honour is claimed by more than one inventor) have started from the mechanical fact that the chief strength of wrought-iron lies in the longitudinal direction of its fibre. Injury by excessive explosion, they consider, is inflicted on a wrought-iron gun by bulging its barrel, rending the fibres apart as if they were threads in a thread-paper. To counteract this tendency, and to make use of the utmost strength of the material, the bars of iron used to build the gun were therefore bent in a spiral, and welded together into a tube, three lengths of bar being required to form the barrel, which again was strengthened by other coils shrunk upon the primary ones, so as to thicken the breach. Mr. Whitworth preferred the forging of a single ingot or bar of steel, the solid centre of which was afterwards bored out, and the breech strengthened by hoops forced on cold by hydraulic pressure. It is enough to say that while by each of these laborious and costly processes guns may be produced far superior to any that were considered necessary a quarter of a century ago, yet neither the coil gun nor the hooped ingot gun is strong enough altogether to resist the explosive force of powder. Experiments were made by the Committee on the 12-pounder guns by firing with the service charges of powder, and one or more shot, with air spaces between the charges and the shot, the object being to ascertain which gun would have the greatest powers of endurance, and also the manner in which they would burst. The breech-loader was fired with a charge of 1¼ lb. of powder, and a shot of 11½ lb. weight. The Armstrong muzzle-loader, with a charge of 1¾ lb. of powder and a shot of 11½ lb.; the Whitworth with a charge of 1¾ lb. of powder and a shot of 12 lb. Under these graduated tests, the trunnion ring of the breech-loader was cracked at the 33rd round; and at the 42nd round it had opened to the extent of an inch. The muzzle-loading Armstrong was cracked at the 60th round, the coil in front of the trunnion being found open and near to the gun, as if it had simply fallen off. The Whitworth gun burst violently into eleven pieces at the 92nd round. The strength thus evinced in each instance exceeds the ordinary requirements of the service; but the explosive force is still in excess of the resisting power of the gun when repeatedly and severely tested. In the case of the 70-pounders, after a practice of 3,000 rounds from each, the Committee endeavoured to burst them. The strength in each instance, however, was so great that the ammunition was exhausted without the bursting of either gun, 102 rounds of disruptive charges having been fired from each. The breech-loader was slightly cracked in the powder chamber, but uninjured in the body of the gun. The Armstrong muzzle-loader had fractured the steel barrel at the breech, but the superimposed coils were uninjured. In the Whitworth the bore was expanded 3-10ths of an inch, and the outer hoop shifted forward. In these experiments Sir W. Armstrong had adopted a steel barrel, with iron hoops; Mr. Whitworth a steel barrel with steel hoops. The result of the experiments appears to be that a trustworthy service gun can be constructed on either principle; but that the power of powder is still in excess of the resistance of the material of which the weapon is composed.

The projectiles invented by Mr. Whitworth are characterized by as great an advantage in penetrating power as they possess in range and in accuracy. For the most serious service for which artillery is required, the attack of armour-plated vessels, the superiority of the punch-headed steel-bolt is incontestable, as it is found to cut a clean hole through a target, even at an angle which causes any other shot to glance. In the experiments with steel shell it was unexpectedly discovered that a fuse is unnecessary when firing against armour plates. The blow with which the missile punches out its path imparts such heat to the metal as to fire the bursting charge, and it has been found necessary to wrap the powder in flannel to prevent the explosion of the shell until its penetrative force is exhausted. To the invention of these two irresistible projectiles, Mr. Whitworth has added that of a form of case shot which the committee characterize as "an invention of very great value to her Majesty's service."

It seems unnecessary to add another word as to the necessity of the adoption for the defence of the country of the Whitworth system of guns. Yet two most important features of the case remain unnoticed. The first is this. The capacity of a gun to consume powder, and therefore its requisite strength to resist disruption, is measured by its calibre; and therefore, supposing all the questions of construction to be satisfactorily solved, the weight of the gun should be in definite proportion to its bore. Now, in the trial of the so-called 70-pounders (leaving aside the breech-loader, as withdrawn from the competition), the two guns pitted against each other differed materially in calibre. The Whitworth gun, with a bore of 21·33 in. area, burned 10 lb. of powder, and threw a projectile of 70 lb. weight to a maximum distance of 8,078 yards, against a maximum range attained by the Armstrong gun, with a similar charge, of 6,528 yards, an excess of 42 per cent. The weight of the gun was 78 cwt., being 3 cwt. 2 qrs. 17 lb. per sectional inch of bore. The Armstrong gun had a bore of 32·31 in. sectional area, which gave only the proportions of 2 cwt. 1 qr. 11 lb. of weight of the piece per sectional inch of bore. A difference of more that 50 per cent. in a matter so important as ratio between weight and capacity was certain to tell its own story under experiment. The truth is that the Armstrong gun, with a capacity to burn 15·15 lb. of powder, was, in point of fact, a 106-pounder under-loaded and under-shotted. This view of the case is supported by the fact that when each gun was fired with a larger charge of powder, the increase of charge from 10 to 12 lb. in the Whitworth only increased the initial velocity 4 per cent., or by 57 ft. per second; while the same increase of charge in the Armstrong gun increased the initial velocity 12½ per cent., or 164 ft. per second; and a further augmentation to 14 lb. (still less than the capacity of the calibre) increased the initial velocity by a further 2½ per cent., or 37 ft. per second. The comparison of range is less precise, as the 10 lb. charges were fired at 6° of elevation, and the 14 lb. charge at 5°. The Armstrong range at 6°, with 10 lb. of powder, was 2,666 yards, with a mean error of 25·5 yards. The Whitworth range, under the same conditions, was 2,948 yards, with a mean error of 25·6 yards. The range of the Armstrong gun at 5° of elevation, with 14 lb. of powder, was 2,810 yards. But the effect of the trials for duration plainly shows that a charge of 12 to 14 lb., which was less than that due to the bore of the gun and demanded by the diameter of the projectile, would have altogether exceeded the powers of endurance possessed by the piece. The inference is undeniable that the Whitworth 5·28-in. gun is one duly proportioned for the discharge of a 70-pound shot, and that the Armstrong 6·4-in. gun is not so proportioned, its power of propulsion being proportionate to the discharge of a 106-pound shot, and its powers of endurance being only those due to a 70-pounder. The great superiority of the Whitworth gun is thus again brought to a definite test. Of the competing 5·28 in. and 6·4 in. diameter guns, the first is duly considered and fairly proportioned as to diameter and weight, and the second is not. To produce a gun which must, if it is to endure, be always under-charged by 40 per cent., is not a triumph of construction; nor is such a weapon one that can with due regard to safety be issued for service.

The other question relates to the cost and durability for service of the projectiles. The former of these elements is of far more importance in the Army Estimates than the original cost of the guns themselves. We have just seen a comparison between two large cannon for 3,000 rounds, which were fired without injury to either

piece of ordnance. We have also seen that the Armstrong 70-pounder, with 14 lb. of powder, fell short of the Whitworth 70-pounder, with 10 lb. In this sole comparison, therefore, if we suppose the powder to cost 50*l.* per ton, the Armstrong gun would have cost, if fired according to its capacity, 600*l.* more than the Whitworth, a difference doubling the original price of either weapon. The report gives little information as to the actual cost of the projectiles themselves, and we are unwilling to supply the defect from any less impartial source of information. But if we regard, on the one hand, the rapidity with which the solid spiral bolt can be turned out of hand by machinery, and, on the other hand, consider either the complex process of coating with lead, or the troublesome application of zinc or copper studs, there can be little doubt as to the superior cheapness of the hexagonoidal bolt. Again, the more complex projectiles are liable to such damage in the necessary service of the field as to interfere greatly with the exigencies of artillery practice. The only point in which the report of the Committee seems to us to have lost sight of mechanical truth, is where they mention that the studs provide the projectile with a certain power of self-adjustment. The action of the studs in the grooves of the shunt gun would appear to a mechanic almost certain to impart irregularity to the motion of the projectile; while the action of the spiral bolt in the spiral barrel is such as to centre it on the least motion, a fact which no doubt tells for much in the steadiness of its flight. In cost, therefore, of working, in range, in accuracy, and in penetration, the experiments at Shoeburyness appear to establish the claims of the Whitworth guns and projectiles to rank, so far as experience goes, as the first in the world.

FLORENCE IN 1867.

WHATEVER the effect of the change that has raised her to a higher place in national life, Florence still remains the gayest as well as fairest of Italian cities. It is impossible not to be struck by the visible expression on every side of the progressive and energetic spirit now awake here; and the joyousness of the scene makes itself more felt by one led to contrast it with the subdued solemnity of that capital where the church reigns supreme—should he happen, that is, to have passed immediately from one to the other. The Florentines may have something to complain of in respect to taxation, increased expenses of living, &c., but it is impossible not to recognize in the conditions of their city the prevailing evidences of things that tend to and proceed from the general well-being,—the proofs, in short, of progressive prosperity.

The works for the enlargement of this capital have been advancing, since the beginning of the year, with tolerable activity, though not yet very striking in their results. Most promising is the new quarter now rapidly springing up on the southern side between the Porta S. Gallo and Porta Croce, while the style of buildings and laying out of streets present altogether a cheerful and pleasant picture, and seem likely to attract the fashionable world. The best characterized houses are specimens of the modern Italian, without any attempt to imitate the palatial grandeurs of Florence of the fifteenth century, but with general resemblance to the spacious and aristocratic residences that date from subsequent periods; the walls of brick, or irregular stonework, in every instance coated with stucco, coloured to imitate the dark grey or dark yellowish stone found in neighbouring quarries, and so much used in Florentine churches, uniformity being systematically avoided, and each house having its distinct features, however a certain type may predominate,—the ground-floor stories mostly of rustic masonry, so also the stone facings often introduced at angles; doors and windows sometimes arched, the latter, in almost all cases, surmounted by dressings, or, we might say, pediments, either curved or triangular, the two forms often alternating, many of the best residences having gardens at the rear or at one side; and at the level that forms a centre to this new quarter, already is opened to the public a much larger garden, planted and laid out in walks, that promises to become an attractive promenade when trees shall throw a deeper shade, and the air of novelty be worn off. That extent of fortifying walls which bounded this region is almost entirely demolished; but its *débris* being not yet cleared away, the long line of ruins that rise like a steep embankment, still forming a barrier between town and country, present a somewhat dismal feature in this otherwise pleasant quarter, and give the idea of works lately overthrown by the artillery of besiegers. Beyond, however, we have the view of the hills of Fiesole and loftier Apennines, whilst we inhale the fresh air that breathes from mountain and plain, reminding of the advantages to health and enjoyment securable for the inmates of the city's new streets on this side. Southward, where the fortifications are more ancient and picturesque, they have been left untouched, and it is understood that in this extent they will be spared, seeing that the steep rising ground along which they are carried, between Porta Romana and Porta S. Nicolo, offers no inducement to the extending of street-lines, and is in great part occupied by the gardens of the Pitti Palace. The Mediæval gateways, picturesque structures in their way, are also to be preserved, out of regard for historic antiquity, and for the art details, symbolic sculptures, animals and shields, frescoes of sacred figures, by which most of them are adorned.

The *Porta Croce* is destined to stand isolated in the midst of a spacious square, for creating which much of a populous suburb will have to be swept away. Between that gate and the river side has been re-opened the long-shut *Porta Ghibellina*, whose very name had disappeared from the Florence map, and whose archway had been built up to serve as a guard-house. Of this city's more ancient gateways eight were either built up or destroyed in the first years of Medician sovereignty; and that leading to the church whose name it bears, *S. Miniato*, had long been closed before its re-opening in 1834. Alike has been given back to public transit the *Porta S. Giorgio* on the height near the Belvidere fortress, a gate long reserved for military use, the river side of which has a good fresco by Bernardo Daddi, the outer a relief of Saint George and the Dragon. A fine fresco of the Crucifixion, life size, has been removed from its tabernacle, near the S. Gallo gate, to the museum in the Pretorio. Most important among works of demolition hitherto undertaken is that for destroying the "Fortezza da Busso," built by the Duke Alessandro de' Medici, 1534, with the architecture of Sangallo and two others, in the dungeon of which gloomy fortress the life of Filippo Strozzi had its tragic close. Condemned to perish as now utterly useless, and an obstacle to the city's development on the northern side, its low but extensive buildings and wide range of outworks will disappear to give place to a very spacious square, destined, it is said, to serve as a *Champs de Mars* for military parades. As yet indeed little has been accomplished towards this object, save the filling up of the moat and certain earthworks; the dark pile of that Medici castle, looking so like a den of tyranny, being still before us in horrid contrast to the beautiful scene amidst which it stands between the city and the cultured, mountain-girt plain.

Another project of importance, the works for which are now claiming notice, is the construction of the new "Lung' Arno," to extend along the river's left bank, commencing from a south-easterly point, and to be carried along the water-side so as to correspond with the magnificent promenade, so well known to all tourist-visitors, that presents the finest perspective in modern Florence on the Arno's left bank. In their present inchoate stage, these works are aimed at throwing up a mole, that considerably narrows the river's bed by its encroachment, near the oldest of the bridges, *Ponte delle Grazie;* and numerous labourers are engaged all day behind palisades set in the gravelly ground through which the Arno flows, reduced, at this season, to a stream dwindling into insignificance at certain parts. For this improvement it will be necessary to knock down many picturesque old houses that rise, piled up in irregularities of good effect, immediately above the water. Public convenience has been well consulted in the other undertaking now in progress on the most frequented of the bridges, *Ponte Carraia* (originally of wood, first built in stone 1338, and restored by Ammanati, 1557); the bad condition of which was the more to be complained of as this bridge forms the principal approach to the chief market-place in the "Oltr' Arno" quarter. It is to be provided with causeways of iron-work, adding largely to its width, as well as new pavement for the central part; pending the labours for which, this busiest of Florentine bridges is now only passable by pedestrians. We are glad to see the praiseworthy practice of distinguishing the homes of genius still kept up amidst the current of novelties and new activities in this city, alike since, as before, she became the Italian capital. On a house of modest dimensions in the Via S. Sebastiano, behind the *Annunziata* church, we read the following on a lately-placed tablet, that well honours the illustrious dead:—

"*In questa casa abito il pittore senza errore, Andrea Vannucchi Fiorentino, detto Del Sarto, che reduce di Francia la edificò, e vi morìva nell' anno MCCCCCXXX., pieno di gloria e di domestici affanni.*" (In this house resided the painter without fault, Andrea Vannucchi, of Florence, called Del Sarto, who built it after his return from France, and died here in the year 1530, full of glory and of domestic afflictions).

Turning to the examples of entirely new architecture for public purposes, we do not find that Florence has received additions to be proud of. The ministerial palace on the Piazza S. Marco is not saved by greatness of scale from insignificance of character; that for the Minister of Public Works, Via della Scala, has better, but no very admirable, features. The façade of the Corsi Palace rebuilt as necessitated for the widening of the street, is the only architectural novelty of imposing or superior style; and this also is open to criticism for deficiency of projecting masses, and largeness in details; the occupying of the ample arched recesses that extend along its ground-floor by shops, whose windows fill the openings, detracting from the palatial in this great mansion's aspect.

Among realities of the day, the present conditions of the convents cannot be left unnoticed. The cloisters of S. Croce are in part let to families, in part used for a public office; at those of S. Maria Novella, the largest in Florence, no fewer than five Government offices are located. S. Marco, most interesting from art contents, and which was declared by edict, in this last year, to be "a national monument," is now destined to become a museum of sacred art, where several works of Fra. Angelico, besides those painted on the walls of its cells and corridors, will be collected, some from the S. Maria Novella Church; and the largest of two deserted refectories will be the principal hall for this sacred exhibition. Ten of the Dominican community are still left in the S. Marco convent; though, according to the letter of the law, six is the extreme number allowed to remain for life, in order to guard the premises and officiate in the churches of those establishments that must eventually disappear; and repairs have been begun (but for some weeks suspended) in the above-named convent, for better adapting it to its new purposes. Under these circumstances, S. Marco is a mournful and silent place; the mason's work impedes one's advance through its interior; the frescoes of the "Beato" are mostly covered for protection, till this confusion shall be at an end. But in the chapter-house we still see the "Crucifixion," largest and noblest among the wall-paintings by that friar, in good light and with every convenience for spectators; a set of engravings of all the frescoes here by the same gifted hand being on sale in the same room.

In conclusion, we must testify to the general intelligence and taste, the religious respect for antiquity, for all that charms the eye by beauty, or the mind by association, in the principles that have presided over the complicated task of renovation at this centre; and we must rejoice in the tokens that promise for the capital of Italy such graceful distinctions as were ever owned by the "Etrurian Athens" in days gone by.

DIAMONDS.—At a recent meeting of the California Academy of Natural Science, Professor Whitney remarked that there are fifteen localities in California at which diamonds have been found in the course of washings for gold. In reply to a question if there was not some familiar test by which miners might prove them, he answered that the easiest way was to try their hardness on other gems, but miners have not always these convenient to do so. A knowledge of the crystalline form, twenty-four sided and the faces curved, was the surest test. He said that the popular notion that a diamond could be hammered on an anvil without breaking, was a mistake, resulting from confounding hardness and toughness. Also, that it would not pay in California to wash the gravel beds solely for diamonds. Diamond washings do not pay in any country, except with slave or convict labour.

THE CASTLE OF ARQUES.

THE Castle of Arques, one of the earliest, largest, strongest, most remarkable, and most celebrated of the pure Norman castles of Normandy, has had the advantage of being described by M. Deville in 1839, and illustrated, more recently, by the pen and pencil of M. Viollet-le-Duc.* To the work of the former of these authors the present writer is indebted for much of historical matter, and for the leading dimensions of the castle and its details; but, having recently visited Arques, he has formed his own opinion upon these details, and is responsible for them. M. Le Duc's account is very minute, and especially so upon the complicated arrangements for the entrance into and defence of the Norman keep. His statements probably rest upon plans and drawings of the building at some period when it was far more perfect than is at present the case. Indeed, at this time, the details do not differ materially from many Norman keeps of the same century in England, nor can I observe certain traces of some of the more complicated arrangements spoken of.

The castle and the county (*comté*), or, as we should say, the earldom of Arques, have played important parts in the local history both of France and Normandy. The town of Arques was the capital of Talou, the Roman Talogium, a name well known as late as the eleventh century, when it passed gradually into disuse, being superseded by the equally old but more limited appellation, which, by the creation of the Comté d'Arques in favour of the Conqueror's uncle, became extended over the whole lordship.

Talou or Arques, in extent about 14,000 acres, lies open to the sea upon the old frontier of Normandy. To its north-east was the territory of the powerful counts of Eu, and to the west and south the divisions of Brai, Caen, and Rouen. It is a tract of high table-land of chalk, deeply scarred with valleys, some steep, short, and dry, others broad and level, giving passage to streams of some beauty, and the sources of much fertility. It was in request on account of its frontier seaboard, the strength of its positions, and its agricultural wealth.

For these reasons it was an early resort of its Norman rulers. Duke Robert, in 1031, designates it as "one of our residences;" as does his renowned son in 1047. Duke Robert died in 1035, leaving William then eight years of age, and who was formally recognised as the heir in 1038, about which time his paternal uncles of the half-blood, William and Mauger, sons of Duke Richard II. by his second wife, received from him the one the Comté d'Arques, the other the Archbishopric of Rouen.

The Norman nobles profited by the infancy and questionable title of their sovereign to strengthen their own positions, and William of Arques seems at once to have commenced and rapidly to have completed the present castle, which may therefore be attributed to between 1040 and 1045. Its completion tempted him into rebellion, upon which Duke William took possession of the fortress, which, however, his uncle speedily recovered by an understanding with the Duke's castellan. Then followed a second and more dangerous insurrection. The duke heard of this at Coutances, in Lower Normandy. With instant speed, gathering force as he rode, he reached the town, and was in time to cut off a portion of the supplies on their way to the castle. He then attacked the advanced posts of the garrison, placed probably on the site of the present outer ward, drove them into the enclosure, and established a blockade. As the only gate of the place was at that time on the north, he threw up a fortified camp on that side, the ditch and palisade of which included the entrance to the castle, and a space in the direction of, but probably larger than, the later Bel or Bailey. It was strengthened—

> "De fosse et de heriçun
> Et de pel fist un chasteillun;"

That is, "with ditch and palisade, and castlets he formed of piles." This he placed in charge of Walter Giffard, so well known afterwards on English ground. The garrison numbered 300, while with Giffard was a body of knights and men-at-arms. The duke then retired to settle his pressing affairs in Lower Normandy.

Archbishop Mauger having stirred up Henry I. of France, that monarch prepared to raise the siege, and was supported by the followers of Enguerraud of Ponthieu, brother-in-law to the count, and shut up with him in the castle. The French coming impetuously to the attack, neglected proper precautions, and were beaten back by Giffard, and Enguerraud was slain; but nevertheless supplies seem to have reached the castle. Upon this the duke returned from Valognes to the camp, and finally starved out the garrison. This was followed by the battle of Mortemar, in November, 1054, by which William secured his seat upon the ducal throne. After this event Arques was placed under the charge of a sheriff or vice-comes.

The revolt and blockade, the attempt of the King of France, the arrival of the duke, and the surrender of the castle, form the subjects of 160 very spirited lines in "Le Roman de Rou," which informs us that

> "Willame d'Arches fu mult fier
> E bun e hardi chevalier,
> Frere l'Arceveske Maugier
> Ki mult l'amont è teneit chier."

And thus disposes of the result of the whole business:—

> "Maiz pur viande ki failli
> Terre è chastel et tur guerpi;
> Al Duc Willame tut rendi
> Et al rei de France s'enfui."

William Rufus, having secured England, entered Normandy on the side of Arques, but the castle was held for Robert Curthose until the accession of Henry I., and the capture of Robert at Tinchebrai, in 1106. Arques, once in Henry's hands, was held by him, notwithstanding the attacks of Baldwin, count of Flanders, upon that frontier; and after his defeat of the French at Vexin, in 1119, he imprisoned Ormond, lord of Chaumont, in its dungeons. His sense of its value led him to strengthen it in 1123, and he held it until his death.

King Stephen, though he obtained possession of several Norman castles, seems only to have retained Arques. Geoffrey Plantagenet besieged it for a year, and at last, in 1145, obtained it by the accident of the death of Lemoin, the castellan, who was shot by an arrow.

In 1150, before the accession of Henry II., son of Geoffrey, to the throne of England, Arques was attacked by Louis the Young of France. Henry marched to its relief with a powerful army; but it was not till long afterwards, in 1173, that the combination of the same Louis with Henry, son of Henry II., really menaced its security. Aumale and Drincourt, two strong frontier castles, were at once surrendered, and Henry advanced upon Arques, with the Counts of Flanders and Boulogne. While actually beneath the castle the latter was slain by a Norman knight. This broke up the federation, and Prince Henry retired, leaving the castle still in the hands of its proper sovereign.

Under the treaty of Mantes, in 1193, between Longchamp, on behalf of Cœur-de-Lion, then in prison, and Philip Augustus, Arques and three other castles were to be placed, two in the hands of Philip, and two in the neutral hands of the Archbishop of Reims, to be held until France had received 20,000 marcs, one castle being restored at each payment of 5,000. Philip, upon this understanding was to obtain Richard's liberation.

Prince John, by secret and dishonest covenant with Philip, was substituted for the archbishop, and placed in possession of Arques, and the castle, thus virtually in the hands of France, was one of those which, under the truce of 1194, Philip was free to fortify or destroy. Richard, however, once in the field, bent himself to its recovery. He took post before it in 1195; but his adversary, with 600 knights and barons of France, came to its relief. Richard retired after a bloody struggle, in which the Earl of Leicester was made prisoner. Philip then burnt Dieppe, already a considerable post, the growth of the preceding century, but in his retreat suffered the loss of his rear guard at the hands of Richard.

Philip marked his possession of the lordship of Arques, and his sense of its value, by bestowing it, with his sister Alice, upon William, count of Ponthieu, retaining a power of redeeming it for 5,000 marcs of silver. Nevertheless, before a year, Cœur-de-Lion became lord both of the land and the castle, and this by virtue of a treaty. He entered early in 1196, and placed Geoffrey de Say, whose name is preserved in Dover Castle, in charge of the fortress and of the lordship. His accounts, which are still to be seen in London, include, in 1198, a charge of 35*l.* 2*s.* 8*d.* for repairs of the building of the castle of Arques. These accounts also show an expenditure of 496*l.* 13*s.* 8*d.* for the support of the king's niece (Eleanor), daughter of the Countess of Britanny, whom we thus learn to have been in residence here. She was the sister of the unhappy Arthur, then at the court of France. The large sum, more than half the receipts of the lordship, placed annually to her credit, shows her treatment to have been on a very liberal scale. After Richard's death, and that of Arthur, John removed her to Corf. She is said to have lived till 1241.

In 1200 King John ordered the usual inquisition into the state of the castle to be made by four true men of Arques, and 450 livres to be spent on the fortifications, if necessary. He was there himself in that year, and there signed a grant of market at Sackville to Jordan de Sackville, ancestor of the dukes of Dorset. He was also there 17th and 18th May, 1202, and his visit was followed by a hostile one from Philip Augustus, who appeared before the castle with a proper siege apparatus very shortly afterwards. For fifteen days, according to Matthew Paris, catapults and balistæ were directed against the walls; but the garrison, having greatly the advantage of elevation, caused the besiegers to retire to a more respectful distance. Philip, therefore, prepared for a blockade, and directed vessels from the Flemish ports to bring supplies by sea. A letter of John, in July, 1202, addressed to the Baron of the Cinque Ports, directs them to intercept these supplies. It was then that Philip learned that Arthur had fallen into the hands of his uncle. His fury was great. He broke up the siege to attack John in person, while William Cumin, the castellan, acknowledged the bravery of his garrison, and, under an order from John in January, 1203, paid 547*l.* 12*s.* 3*d.* as their arrears. This king, also, in February, showed his gratitude to the burgesses by a grant of certain liberties to their town, witnessed by the well-known names of Gurney, Furnival, Fitzgerald, Mortimer, Sackville, Turberville, and Rivers. In 1203 Wm. Mortimer and Wm. Martel were placed in charge of the castle, which was provisioned afresh, and payments were ordered to the garrison through the exchequer.

The cares of John were unavailing. Normandy was about to fall. Château Galliard after near a year of siege, Rouen after a stout resistance, Falaise and Caen, and the other strongholds of the Norman dukes, were now in the hands of France, and the Arquescons received only the sad honour of being the last to surrender. In 1204 Arques became French territory, but its castle had never succumbed to an assault.

The change, however grateful to the inhabitants, who entered upon a career of many years of peace, was fatal to the fame and glories of the castle. The castellan became a mere collector of revenue, or was occasionally called upon to compose the disputes of the local clergy. Before ninety years had passed, the Norman garrisons were reduced, and so many castles dismantled, that one alone — that of Arques — was preserved in Upper Normandy. In the meantime, it had been visited in 1273 by Philip the Hardy, who there confirmed the privileges of Rouen accorded by Philip Augustus in 1207.

In 1348, under Philip of Valois, its garrison was but four men-at-arms and twelve archers; but in 1355, when the designs of Charles the Bad, of Navarre, drew the attention of King John to his Norman frontier, Arques was directed to be put in order. The keep was to be repaired; one of its turrets leaded; and mention is made of the king's chamber within its walls. Timber was brought in from the forest, the drawbridge newly planked, the chains and ropes renewed, the working gear greased, the stables put in order, the well-ropes examined, the loops and windows repaired, and the tiled roofs made good. Nothing, however, followed this alarm. The dangers of France came on the side of Crecy and Poitiers, and King John was shortly afterwards a prisoner in an English keep as strong as Arques, and almost of the same age.

Under the treaty of 1359, for the liberation of King John, which, however, was not executed, Arques was one of the fortresses to have been delivered up to England.

In 1366 Charles V. confirmed the privileges granted to the people of Arques by John Lackland, in 1203. In 1378-80 the accounts witness to masons and carpenters having been employed at the castle. Buildings, destroyed by fire, were replaced. Caen stone was brought by sea for the repairs of the walls. Much was done to the

* "Histoire du Château d'Arques," par A. Deville. Rouen. 1839. "Dictionnaire raisonné de l'Architecture," par Viollet-le-Duc. Paris. 1858. "Art. Château et Donjon."

Keep or Great Tower and to the prisons, and a garrison was retained in the place.

The next event in the history of Arques, followed upon the English invasion of Normandy under Henry V., and the fall of Rouen in 1419. One month after this Arques opened its gates to the Duke of Clarence, and received the English Philip Leche as its captain, who in a short time was succeeded by John de Baskerville, and his lieutenant, Peter Lee, under whom the castle was once more put under strict military discipline. Ralph Botsler, of Sudeley, knight banneret, was their successor, and the garrison was reduced from ten to four men-at-arms, and from thirty to twenty-six archers, and the latter number was again reduced to twelve, in 1428-9. The prospect of an attack on Rouen caused these figures to be somewhat increased, and Gervase Clifton, Botsler's officer, raised them to fifteen and afterwards twenty men-at-arms, half horse and half foot, and sixty archers.

After the death of Henry V., when the time came for the expulsion of the English, the peasantry of the north rose in arms, but amidst the general fall of strong places, Arques held firm. Henry VI. was there in 1435, and there signed a charter in favour of the Archbishop of Rouen. Talbot came to Arques in 1442, when he besieged Dieppe, and trusted to that fortress to protect from the French army the vast siege preparations which he had made. John Norbury was then its captain, replaced by Sir Walter Devereux, in 1445.

The castle of Arques was one of the strong places agreed to be surrendered to Charles VII. upon the fall of Rouen in 1449. Meantime, however, the garrison of Dieppe had turned the tables, attacked Arques, taken the Bel by surprise, and laid siege to the castle,—which, however, surrendered, not to their force, but in virtue of the capitulation of Rouen.

The castle now had rest until, in the reign of Louis XI., this side of France was invaded, in 1472, by Charles the Bold. The duke burned the suburbs of Dieppe, and made a demonstration before Arques, but could do nothing more. In 1485, Charles VIII. visited the castle, and the Sire de Lardiniéres claimed the cup out of which he drank as a perquisite of his fee, held by the service of guarding the outer gate of the Bel of the Castle of Arques.

Francis I. visited Arques in 1544 and 1545, but does not appear to have signalized his visits. Under Francis II. Arques was employed as a means of putting down the Huguenots in Dieppe, and in consequence received Catherine de Medicis in 1560. Two years later, Francis being dead, the men of Dieppe retaliated, and drove back the Duc de Bouillon into the castle of Arques; an act which was followed by a series of local skirmishes about the town and castle, with various success, the results of which were swallowed up in the events of the reigns of Henry III. and IV.

1584 found the castle held by Martin d'Epinay, a strong Catholic and member of the League, while Dieppe, still Huguenot, declared for the king. Aymar de Chaste, captain of the port, disguised a body of picked men as fishermen, and sent them laden with fish for sale to the governor. Thus equipped, they were allowed to enter the Bel and the outer ward of the castle. Once within, they killed the guard, rushed through the inner gate, and in a few minutes had secured the place for the king. Henry III. died in 1589.

Henry IV. took up his quarters at Dieppe, where he awaited the tardy and stinted aid of Elizabeth. Mayenne, in command of the army of the League, 30,000 men, hovered on the confines of the town, at about two miles' distance. Henry, holding Arques, established entrenched lines on the high ground, east of the castle, between the river and the forest, but within shot of the walls, which were armed with several pieces of cannon. His troops were placed within the lines, and there awaited the enemy.

It were long, and, without the aid of a map, tedious to tell how Henry fortified Le Polet, by Dieppe, and outmanœuvred Mayenne, until, on the 21st of September, 1589, meeting him on the narrow space between the forest and the river, and under the guns of the castle, he succeeded with less than 8,000 troops in vanquishing the Leaguers with 30,000. The guns of the castle assisted in the battle, and, with the exception of a trifling affair three days later, this was the last and most glorious conflict in which that ancient fortress took part. From this time Henry's cause was, on the whole, successful, and it was from Arques that he wrote to the Duc de Crillon those often-quoted words,—"Hang thyself, brave Crillon: we have fought at Arques, and thou wast not there!"

In 1596 the castle was the seat of a severe endemic, and was cleaned out at a considerable expense.

Louis XIV. visited the castle in 1647, then nine years old, from Dieppe; but it was no longer a military post of importance, and two archers, to open and shut its gates, formed the whole garrison.

As national property it was sold in 1793, and after various transfers, and a narrow escape of destruction for the value of its materials, it has come to be regarded as a relic of the past time worthy of our respect. It is, however, still in private hands.*

* To be continued.

THE PARIS EXHIBITION.

WE have before us a score of letters as to the recent award of medals, mostly complaining and protesting. Some of the complainants have made themselves heard through other channels: little public good will be done by repeating the protests. We have already said that the English jurors have not excited our admiration by results. The English sculptors as a body withdrew all their works from competition. Messrs. Powis, James, & Co. think themselves excessively ill-treated by the award of a bronze medal made to them for their wood-working machinery. "It is not in accordance with the comparative novelty in design, workmanship, and utility of the machines exhibited by us. We applied for and occupied our space with the full belief that we were going to compete fairly with the world in our particular tools; but the result of awards clearly shows that there has been most unfair partiality or want of ability to decide the respective merits on the part of the jurors. We cannot understand why no gold medal should have been given for wood-working machinery in the British section, whilst the Grand Prix and *two* gold medals were awarded for engineers' tools in the same class and group of that section. We consider that there have been greater recent improvements in wood-working machinery than in almost any other kind."

Messrs. Dent & Co. protest, too, against the decision; and so with others. The Rochdale Pioneers claim the prize of 4,000*l.* offered for the organization best calculated to promote the welfare of the working-classes, and think themselves shamefully used because the Commissioners, overcome by the difficulties which surround the adjudication, determine on making no award. Some of the French exhibitors are also calling out for explanations. On the other hand, several of our advertisers, Mr. Thomas Penke for example (*Tiles*), Clark & Co. (*Revolving shutters*), are proud to find that medals have been awarded to them, and would have it made known.

The very early intimation that we gave as to the award of medals to English architects has been seen to be correct.

ACCIDENTS.

AN extensive conflagration has happened in Bermondsey, reducing to ruins property valued at several thousand pounds sterling. The disaster occurred on a piece of ground in Riley-street, on which were erected the manufacturing premises belonging to Mr. Benjamin Wells, builder and joiner. Before the fire was extinguished the five floors of the factory were burned out, the roof destroyed, the timber in the yard severely damaged by fire, &c.

At Sandbach, during a thunderstorm with rain, the water rushed down Hawk-street in such large quantities that the main sewer gave way, and undermined a house. A hole first appeared in the middle of the street, and rapidly increased, till the foundation wall of the house gave way and brought the whole side of the house with it. The inmates escaped, but articles of furniture were carried away. The sewer was built two years ago, and about a month ago a coal-cart, with a full load, got fast in a hole. The same cart ran a very close risk of getting in again while passing over it just a few minutes before the giving way, but this time unloaded. Mr. Stringer (who was contractor for the work in the first instance) procured a number of men who, by placing timbers, prevented the damage extending to the next door house, the tenants of which had turned out. On the same afternoon as this happened, a wall fell at the Sandbach Baths, which occurrence, however, had nothing to do with the sewerage, but was due to the stoppage of a drain and the heavy rain.

One of the carpenters engaged on the cupola of Zion's Church, on Ohio-street, Indianopolis, fell from the spire while engaged in raising the framework of the steeple. He stepped up a ladder about 115 ft. from the ground, missed his foothold, and in falling struck upon the roof about two-thirds of the way from the comb to the eaves, breaking through the slate tiles and sheeting, and bouncing upon the roof of the two-story frame house just west, and thence to the ground. Strange to say, he was not killed outright, but was still alive, although no hopes were entertained of his recovery.

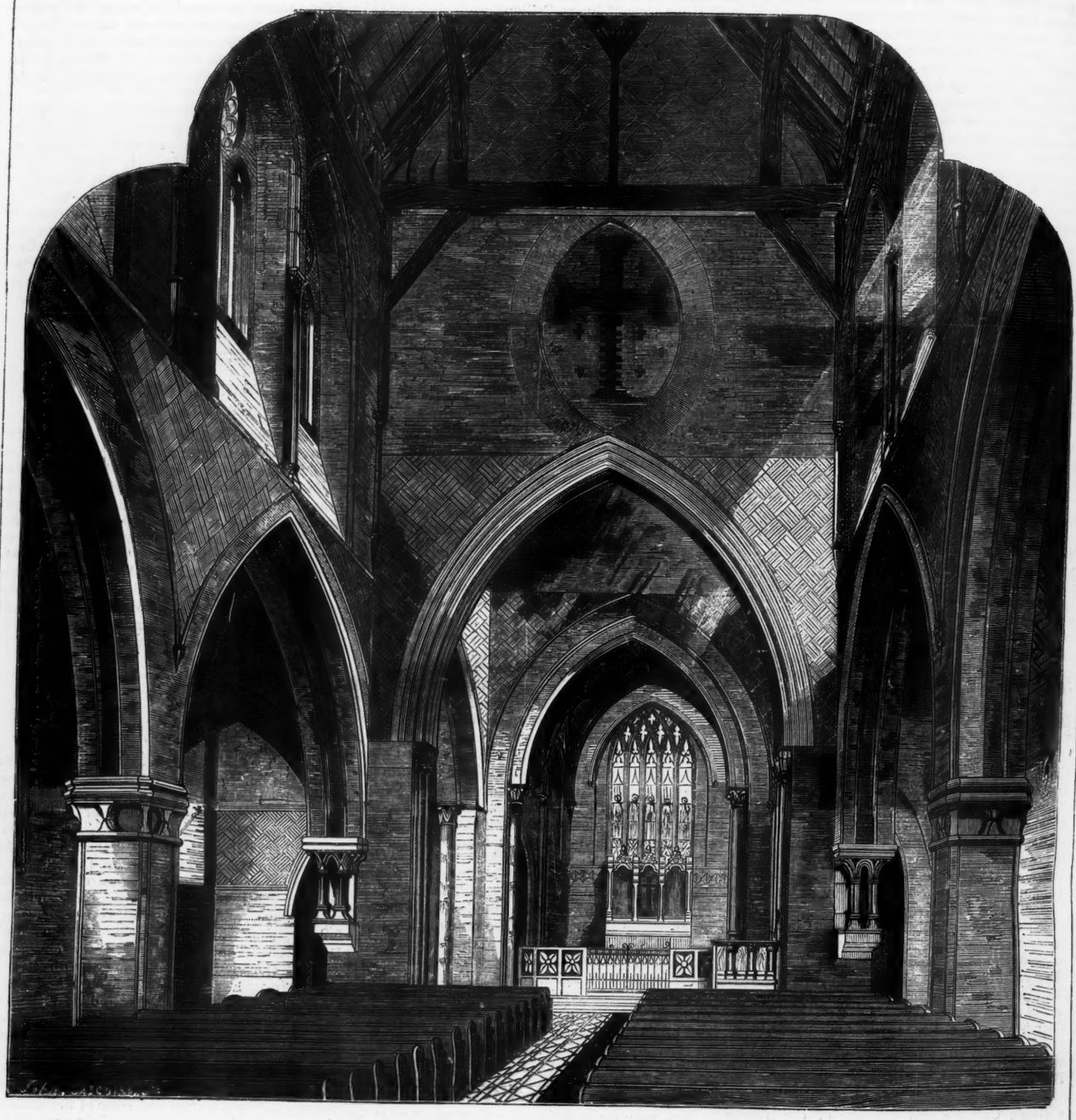
INTERNATIONAL COLLEGE, SPRING GROVE, LONDON.

WE mentioned briefly the other day that the first stone of this building, previously described and illustrated in our pages, had been laid. Let us add that the decorations to ceilings and walls in the interior are being executed by Mr. Lovegrove, of Spring Grove; that the grounds are being laid out by Mr. D. Chester, of North-street, Lisson-grove, who presented the *Wellingtonia Gigantea* which the Prince of Wales planted; the spade (silver and oak) used on the occasion being supplied by the Messrs. Mappin, Brothers. The furniture and fittings are being supplied by Mr. F. Moeder, of Tottenham-court-road.

THE BRICK CHURCH, ST. SAVIOUR'S, ABERDEEN PARK, HIGHBURY.

THE parochial district, St. Saviour's, Aberdeen Park, in Highbury Grove, London, has been formed co-extensive with the estate of the Rev. Prebendary Morrice, vicar of Longbridge Deverill, who has at his own expense erected the church here delineated to meet the needs of the rising population. The plan of the church is cruciform, consisting of a long chancel, with chancel aisles, a lofty central lantern, and transepts, nave, and aisles, and two porches. It follows somewhat the style of the Early Decorated. The nave has a lofty clearstory. The exterior view is taken from the direction of the main approach. The church stands in a large open plot of ground bounded by the road in front of an incomplete circus of semi-detached houses. It is entirely of brick within and without, and is covered with Staffordshire strawberry coloured tiles; the stonework, which is from the Ancaster quarries, being limited to the tracery of the windows and some of the mullions, the capitals of columns, the corbels, and crosses. Even the copings of parapets and gables are of tile, from Bridgwater. With the exception of the local stocks below the plinths, the whole of the bricks are from Aylesbury—red and buff, with a few grey headers. It presents generally a reproduction of the Early Mediæval work, the bricks being long and thin with wide joints, and a mode of bond has been adopted like that prevailing at Bruges in the old buildings. The peculiarity of it consists in the wide side joints, and in the mode of alternation. The courses are alternate headers and stretchers, but the stretchers are placed, not over each other in their successive courses, but over each other in their alternate courses; whilst the headers come over each other in their bonding throughout. This in itself forms a sort of diaper pattern. The side joints are about 1¼ in. wide between the headers, and barely as much between the stretchers.

And this arrangement affects also the design of the diaper patterns, which are confined almost exclusively to the gables and to bands at top of spring of windows, and under the parapets. These diapered patterns and bandings, though somewhat varied, are carried out after the same manner inside as out; and being confined to such salient parts as those enumerated, there is an absence of that striped effect often painfully conspicuous in modern work. But in addition to this, the buff bricks being burnt of clay from the same locality as the red, have a sufficient warmth of tone about them to escape the harsh and startling contrast of colour which



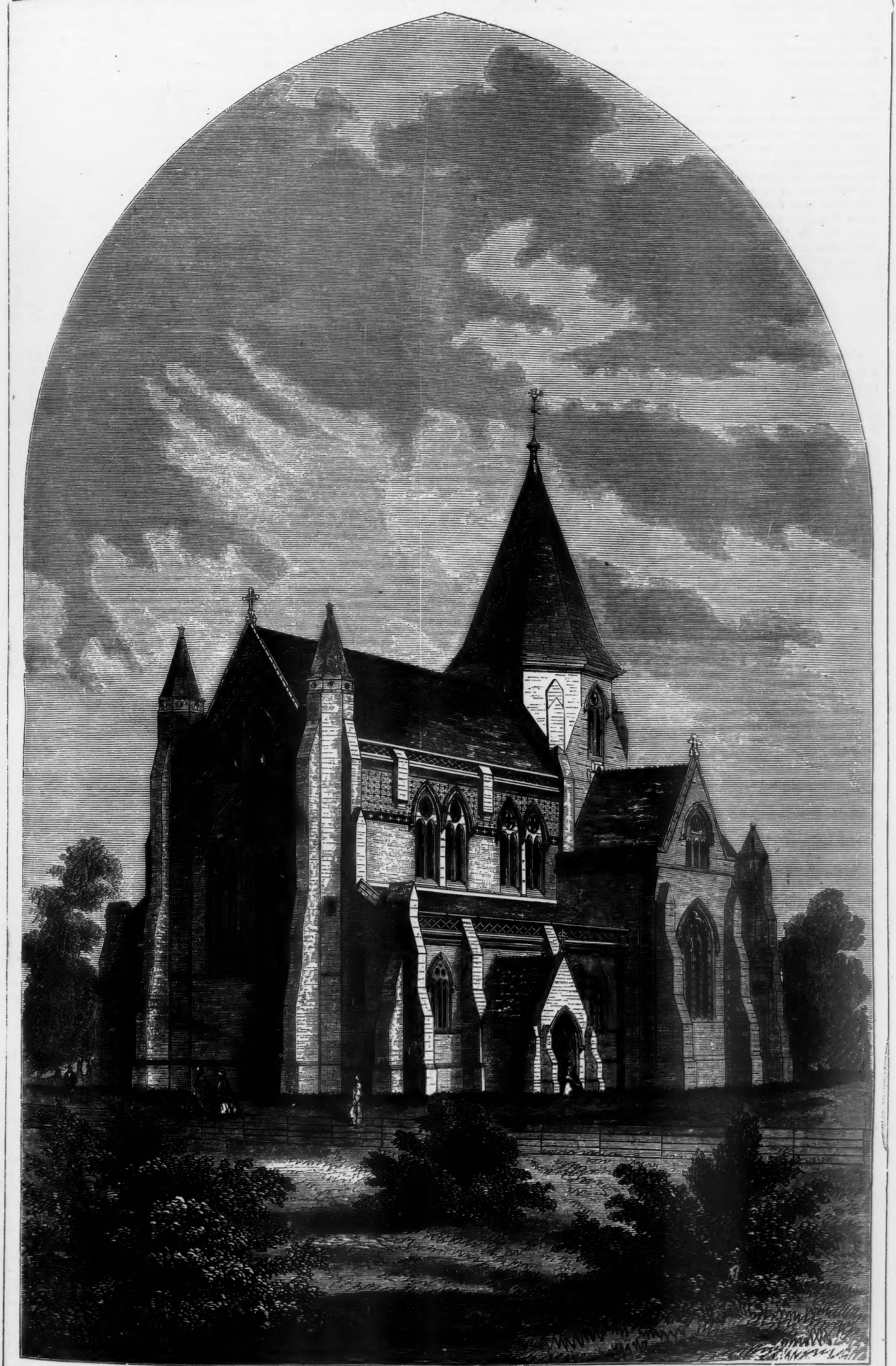
INTERIOR OF ST. SAVIOUR'S CHURCH, HIGHBURY.

apparently is considered in these days a great desideratum. In all cases where bricks are brought from different localities, and present a strong contrast in colour, it is needful to take the greater care to introduce much more sparingly and cautiously the contrasting colour, whether light or dark, into that to which it is intended to serve as a "dressing." Colours may be *blended* in almost equal masses; but if they are strongly contrasted there must be a strong preponderance of only one colour relieved, not crudely and recklessly, but delicately and carefully by the others.

The general effect of the brickwork externally is that of massiveness and repose; but internally the largeness of joint both in width and height, following as it does naturally, if not necessarily, that of the exterior, presents an amount of roughness not altogether pleasing. The eye craves for more finish and delicacy of texture for interior work, though this may be purchased at too extravagant a cost. But in the present case the roughness will be nearly, if not entirely, neutralized, when the original idea is carried out of having the whole of the walls diapered in colour, with the brickwork for a ground, in precisely the same manner (though of different design) as the walls at the east end of the chancel, on either side of the altar.

The bricks measure 10½ in. by 4½ in. by 2½ in., and it may be interesting to know that they cost at Aylesbury exactly the *same in proportion* to their cubical contents as the common Aylesbury brick, viz., 30s. per thousand, and the moulded bricks, 50s. It will be seen from this that the difference in cost for arches, &c., between brick and the most available stone, would be as about 1 to 6 or 7. The question of the employment of brickwork for churches is important. It is true that internal plaster surface, such as that commonly used in Mediæval times, is the easiest and cheapest mode of finish. Plaster is, likewise, even more susceptible of decorative painting; but for arches and other structural features plaster is inadmissible excepting in the case of square soffites built of rough rubble stonework in certain localities; and it is certain that, until decoration *can* be provided, the baldness and coldness of plaster is less pleasing than the warmth of colouring obtainable by brickwork. Experience, moreover, shows that it is in vain to seek at present for any extensive revival of colour in churches.

The pillars supporting the arches are built of Staffordshire pressed brick. The smaller shafts generally, both attached and detached, are of Aylesbury brick, with structural bondings. The open parapets of the church are built of tiles made for the purpose. The ceilings of the sanctuary and lantern internally are groined in wood, with ribs and match-boarding for future painting. The bells are hung in recesses outside the western gable. A baptistery, containing a carved and canopied font is formed in the western bay of the south aisle. The pulpit is of polished red and grey Aberdeen granite, with caps carved in white alabaster. The church is built to accommodate about 400 persons. The chief portion is open benched, but chairs are provided in the space at the west end in the chancel aisles. The seats are placed upon a floor of wood blocks, the passages and chancel being paved with Minton's tiles. The chancel is chorally arranged, and a lectern and Litany-desk are provided in the nave. The reredos is canopied in stone with three panels beneath, representing the two SS. John, and the Agnus Dei on a cross, with the Evangelist's symbols round, painted in the process developed by Mr. Gambier Parry. These are from cartoons by Mr. William White, F.S.A., of Wimpole-street, the architect of the church.



ST. SAVIOUR'S CHURCH, ABERDEEN PARK, HIGHBURY.—MR. W. WHITE, ARCHITECT.

NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE.

THE annual meeting will be held this year in Belfast, from the 18th to the 25th of September, under the presidency of Lord Dufferin and Clandeboye, Lord Brougham remaining president of the council.

In the health department, president, Sir James Y. Simpson, bart., M.D., the following special questions are named for discussion:—

1.—What measures are necessary to secure efficiency and uniformity in the working of the Sanitary Laws throughout the Kingdom?

2.—In what respects do the registration systems of England, Ireland, and Scotland need improvement? and is it desirable that they should be assimilated?

3.—In what form, and to what extent is it desirable that the public should provide means for the recreation of the working classes?

The following are also suggested as suitable subjects for voluntary papers:—1. Improvement of the dwellings of the labouring class. 2. The supply of trained nurses. 3. Town and domestic water supply. 4. Infantile mortality.

In the department of economy and trade, president, Sir Robert Kane, F.R.S., the special questions for discussion are:—

Section A.

1.—What legislative or other measures can be adopted to improve the relations between landlord and tenant in Ireland?

2.—What are the economic results of the continuous emigration from Ireland?

3.—Should the Local Government Acts be extended to Ireland?

Section B.

1.—Can any measures be taken to develop and extend the manufactures of Ireland?

2.—What action, if any, ought the Government to take with regard to railways?

3.—How may the extension of the Irish fisheries be best promoted?

There seems reason to expect that the meeting will be a good one.

A STUDENT CLASS AT THE INSTITUTION OF CIVIL ENGINEERS.

WITH a view of increasing the usefulness of the Institution, particularly to the junior members of the profession, it has been decided to create a student class, to take very much the place of that which was formerly the Graduate class, but with certain modifications, so as to avoid the difficulties that previously arose, and to provide those advantages which experience has pointed out to be desirable. It is contemplated to grant, under the control of the council, the use of the theatre of the institution to the students, for supplemental meetings, for the reading and discussion of papers among themselves, and possibly, also, for the delivery to them of lectures upon special subjects, the object of such supplemental meetings being for the advancement in scientific and technical knowledge of the junior members.

Believing it to be of the highest importance that the profession should not be divided, but should remain one united body, having a position and an influence which one united body only can have, the council are inviting the members to unite with them in the endeavour so to extend and enlarge the basis of the Institution as that it shall continue to embrace within it all branches of engineering and all classes of engineers.

PRIZES OF THE PLASTERERS' COMPANY.

THE Plasterers' Company, as our readers are aware, devote 25*l.* annually through the "Science and Art Department," towards the encouragement of the art of their special craft. These designs and models are now exhibited amongst the national works sent in competition by the various metropolitan and provincial schools, in one of the galleries at the Department of Art at South Kensington, and in reviewing these designs lately, we named the principal prize-gainers in the plasterers' competition; we, nevertheless, now give the complete list:—

1. For an original ornamental corner or angle, suitable for a panel on a ceiling or wall, with a portion of border attached, in any style, to be designed and modelled in plaster, by the competitor. First prize, 3*l.*, R. J. Morris, South Kensington. Second prize, 2*l.*, R. Lunn, South Kensington.

2. For the best model in plaster, from a photograph of one of the designs submitted in competition for the soffit, in 1865. First prize, 4*l.*, R. J. Morris, South Kensington. Second prize, 2*l.*, E. F. Marsh, South Kensington.

3. For an original design, for an ornamental diaper, either square or lozenge-shaped, suitable for a panel of a ceiling or wall. First prize, 3*l.*, W. E. Mackarness, South Kensington. Second prize, 2*l.*, F. Longmore, Stoke School.

These prizes were open to all students in the Provincial or Metropolitan Schools of Art, including artisan classes in those schools.

To F. Longmore, Stoke School, honourable mention.

A medal also was awarded to another competitor by the authorities of the Department of Art for his corner ornament.

A member of the company writes,—

"It would appear at first sight that credit is due to the head school, South Kensington, for gaining five out of the six prizes; but this is not so, for Mr. Morris, Mr. Lunn, and Mr. Marsh received the greater part of their art-education at the Burslem, Stoke, and Sheffield schools, before they came up to the head school to study and improve themselves."

Other subjects for competition are now under consideration to be offered for 1867-8.

TRANSMISSION OF SOUNDS.

THE ALBERT HALL.

IN a recent letter by Mr. Boucicault, pointing out what he calls the "alarming features" of this enterprise, immediately after selecting his own box, for which he had voluntarily agreed to pay 1,000*l.*, the writer makes the following statement:—

"It will be eleven times the size of Drury Lane Theatre, or eight times that of Westminster Hall. A church of ordinary dimensions might stand on its floor; its steeple would not reach the ceiling, which is to be 138 ft. in the clear in height. The human voice cannot fill such a space. But, it may be argued, the new hall, if vast, is designed for performances of vast proportion: the orchestra will accommodate 1,000 executants. I reply that 2,000 voices singing or speaking together travel no further than one voice. They may fill a certain area more completely with that intricacy of waves which, when very troublous, we call a din; but each voice exerts its own influence on the air, according to its power, and dies away within certain limits. A second voice acts independently and produces its own separate effect, not fortifying the first, but distinct from it."

Without now inquiring whether the hall is, or is not, too large, and is, or is not, likely to be a success, it seems to us that this particular statement by Mr. Boucicault, which has been accepted as truth, is not correct. Waves of sound have been likened to waves of water; and in the case of water, as was pointed out in our last when noticing Professor Tyndall's lectures on Acoustics, when the crests of one system of waves coincide with the crests of another system, higher waves will be the result of the two systems. Professor Tyndall lays it down as a rule that, if two sounds be of the same intensity, their coincidence produces a sound of four times the intensity of either.

As an illustration of these statements it may have been noticed that the sound of the cannonading during the recent Naval Review at Portsmouth was distinctly heard 150 miles off. Could any *one* of the guns employed on that occasion have made itself heard there alone?

ANNUAL REPORT ON EDUCATION.

THE Report of the Committee of Council on Education in respect of the year ending August 31, 1866, shows that the number of schools inspected in the year ending the 31st of August, 1863, was 11,230; in the next year, 11,818; in the following, 12,950; in the last, 13,586. The number of children present at inspection in the four years respectively was 1,092,741, 1,133,291, 1,246,055, and 1,287,604; the average number attending the schools, 1,008,925, 1,011,134, 1,057,745, and 1,082,055. The reduction in the number of pupil teachers continues, the last four years' returns showing 13,849, 11,712, 11,383, and 10,955. A considerable part of the apprenticeships never get beyond the third year. The supply of school-mistresses is maintained, but the masters are falling short. Mistresses are cheaper to employ than masters; and the committee of council regard the increased employment of mistresses as closely connected with the extension of grants to the smaller and poorer parishes of the kingdom. Of 11,635 parishes with less than 1,000 inhabitants, and containing together a population of more than 4,000,000 at the last census, only 2,099, or 2 in 11, had any share in the annual Parliamentary grant "for the promotion of education among the labouring classes." The average income of a certificated schoomaster is shown to be 87*l.* a year, the majority living rent free besides. The report acknowledges that the general results of the examinations continue to show too backward a state of instruction. Only 664,005 day scholars were qualified by the 200 attendances within the year, and were judged by the managers to be qualified by attainments for examinations at all, where 803,177 were qualified by age. Only 97,364 passed without failure above Standard III., where 264,231, being over ten years of age, ought to have done so; the difference marking nearly two-thirds passing out of school to work with less of elementary knowledge than Standard IV., denotes,—writing from dictation a sentence from a more advanced book used in the school, reading a short paragraph from the book, and working a sum in compound rules (money). Arithmetic continues to be the subject in which least success is obtained. A number of schools selected from all districts as fairly representative examples show these results:—In 643 boys' schools, with an average attendance of 71,196, 57,036 (80 per cent.) were examined in arithmetic, and 45,584, or not quite 80 per cent., passed; and in 643 girls' schools, with an average attendance of 56,220, 39,589 (70 per cent.) were examined in arithmetic, and 29,931, or 73 per cent., passed.

FRENCH WORKMEN.

IN a report rendered to the Foreign-office this year, M. Julian Fane, secretary of embassy at Paris, speaks of wages of skilled artisans in various towns in France as ranging from 5f. to 10f. a day; for inferior workmen, from 2½f. to 3½f.; for workwomen in clothing establishments, from 2f. to 4f. or 5f.; for children, from 1f. to 2f. The general rate of money wages in France may be said to have increased about 40 per cent. in the last fifteen years, but the rise in money wages has been accompanied by a very considerable rise in the price of the ordinary articles of consumption and in rent of lodgings. So that the improvement in the position of the labourer, meaning his power to supply himself with the necessaries and comforts of life, has been far from commensurate with the rise in the money value of his labour. Still, the relative proportions in which money wages and the price of commodities have risen leave a margin in favour of the former, and to this extent there has been a rise in real wages, enabling the labourer to feed, lodge, and clothe himself somewhat better than he could fifteen years ago.

There is scarcely a trade in France whose members have not combined in the last three years for the purpose of increasing the rate of wages and diminishing the duration of labour; and their efforts to this end have usually met with success. The employers, for the most part, assert that the law has proved to them an unmitigated evil, subjecting them to the tyrannous coercion of the employed. Various forms of the co-operative system are in course of trial in France with a view to prevent or lessen this collision of interests. The association of masons, for instance, is one that has met with remarkable success; some of the workmen are shareholders, and others are engaged as ordinary labourers and have no share in the profits, while some members of the association are simply holders of capital. In other establishments the workmen are allowed to share in the profits of the business by means of rewards or prizes allotted to them, or to the more worthy among them, by the proprietors at the end of the year, or by facilities for procuring food, clothing, lodging, and education for their children on advantageous terms.

FROM WALES.

A RESIDENCE is in course of erection for Mr Chas. W. W. Wynn, M.P., at Meifod, Montgomeryshire. The site selected is one of the most beautiful in the vale. The contract for the house alone, not including the heating apparatus, stabling, lodge, &c., has been taken by Mr. John Potter, of Welshpool, for 4,000*l.* The stabling is being done by daywork.

A residence, designed for Mr. Thos. Gill, at Pont Adeilad, is now in course of erection. The contract has been taken by Mr. George Clark, of Chester, for 1,700*l.*; but this sum does not include chimney-pieces, bells, haulage, stabling, &c.

The church at Pwytherin, Denbighshire, is undergoing restoration. The contract has been taken by Mr. Owen, of Tremeirchion, for 600*l.*

It may also be mentioned that the church at Penmachno, in Carnarvonshire, has been rebuilt. The old foundations were followed, and the roof,

a type of the church roofs in Wales, has been reproduced. The material of the walls was that furnished by the country, blue stone and a peculiar kind of limestone, which served as quoins. The windows and doors were of free-stone.

A vicarage also was erected in the same place, the contractor being Mr. Owen Jones, of Penmachno. The contract was taken for 1,200*l.*

A mansion for Mr. Joseph Gill, of Trewern, Gobowen, near Oswestry, is just completed, the materials for walls being white brick and Ruabon stone. The contracts were taken by Messrs. Barnsley & Sons, of Birmingham, and amounted to over 9,000*l.*

The following tenders were sent in for building residence at Llanychan, near Ruthin, North Wales, for Mr. John Taber:—

George Clark, Chester	£5,802	0	0
W. & J. Webb, Birmingham	5,628	0	0
Barnsley & Sons, Birmingham	5,388	0	0
Abel Roberts, Llandudno	4,313	0	0
Samuel Owen, Ruthin	2,745	0	0

The contract was let to Messrs. Barnsley & Sons. The lodge, gates, stabling, &c., are not included in the above contract.

A residence near Denbigh, for Mr. Thomas Gold Edwards, has recently been completed. The walls are of pressed red brick, fret-work of blue brick, dressings of doors and windows of free stone, and quoins of free stone. The contracts were executed by Mr. Bellis, of Chester, and amounted to about 2,800*l.*

Llysmeirchion, the residence of Mr. P. H. Chambres, the High Sheriff of Denbighshire, is undergoing alterations. The contractors for the first portion of the contract were Messrs. Barnsley & Sons, of Birmingham, and amounted to 2,000*l.*

The works at present being carried out are done by day-work. Messrs. Barnsley & Sons supply some of the materials.

Tenders for building summer residence at Colwyn, on the Chester and Holyhead line:—

Robert Williams, Rhyl	£1,340	0	0
A. Roberts, Llandudno (accepted)	1,025	0	0
Robert Davies, Rhyl	925	0	0

A shooting-box, &c., has lately been completed at Havod Ellvy, about eight miles from Denbigh. The contractor is Mr. George Clark, of Chester. The cost of the works will be about 1,500*l.*

Some time ago it was determined to increase the accommodation at the North Wales Lunatic Asylum; for this purpose two wings were added, one for male and the other for female patients. These wings, with some alterations in the original structure, increased the accommodation 200; and cost, with new kitchens, store-rooms, residence for medical officer, &c., a little over 8,500*l.* The old house accommodated 200 patients, and was erected at a cost of 17,000*l.* or 18,000*l.* It is Elizabethan; the material being limestone, with Bath stone dressings. The new wings are in character with the old, but have freestone from the Cefn quarries—a better weather-stone than Bath. The contractors for the wings were Messrs. George Clark & Son, of Wootten Waven. The head of the firm has since died; Mr. George Clark, of Chester, carrying on the Welsh portion of the business. In this as in all the other works above mentioned, the architects were Messrs. Lloyd Williams & Underwood.

ROADMAKERS' LIABILITIES.

Hyams v. *Webster*, 15 *Weekly Reporter*, Q.B., 619. Various questions have from time to time arisen as to the precise nature of the liability incurred by a contractor taking up, or altering, or repairing, &c., public roads. As a general rule, where the work is properly authorized, he can only be held liable for any injuries to goods or property that may result from the state of a road under repair, if he has been guilty of some negligence. If he has taken all usual and proper precautions to avoid the occurrence of accidents, he cannot be held liable to compensate for the damage that the state of the road may occasion.

In *Hyams* v. *Webster* it was contended that the duty of a contractor who constructs a sewer under a highway is not terminated on the finishing of the sewer and the reinstating of the road, but that he must watch to observe if there is any subsidence or other result from the works which may be detrimental to the road, and repair such subsidence, &c., from time to time. The defendant in this action was a contractor under the Metropolitan Board of Works, and he properly constructed a sewer under a highway, and then filled in the ground and reinstated the road, and in so doing used the usual means, and, in short, was not guilty of any negligence. The road subsequently subsided in consequence of the construction of the sewer; but it appeared in evidence at the trial that some such subsidence always takes place after works of that nature. The plaintiff brought this action against the contractor to recover compensation for the effects of a fall which was caused by the stumbling of the plaintiff's horse in a hole in the road in question. The only point in issue was whether the contractor was under a legal duty to *keep* the road from subsiding after he had done all that was possible to reinstate it after the sewer was completed. The Court, after taking time to consider, decided that the defendant was not liable. This seems almost necessarily to follow from the finding of the jury that there had in fact not been any negligence on the part of the defendant. The case is not very important in its purely legal aspect, but as so much work in the streets of London is done every year by contractors in the position of the defendant, it is worth while to notice the case, as showing very well when such contractors may feel that they have fulfilled the duties cast upon them by the law.—*Solicitors' Journal.*

THAMES STEAM-BOATS AND THEIR DANGERS.

You will perhaps save a life or two if you can spare space for a few lines to call the attention of the proprietors of the river steam-boats to the clumsy and dangerous mode adopted in the embarkation and landing of passengers. As a general rule the only part of the boat in contact with the pier is the corner of one of the paddle-boxes. The landing-rails are seldom used, and passengers pass over an opening generally more or less dangerous. The young folks appear to like the fun of the thing; but to some of that numerous class who, like myself, are too old and fat to indulge in gymnastic exercises, the consequences may be serious.

Surely some contrivance could be suggested to secure, at little trouble, a safe passage. If an iron-railed footway were firmly attached to the boat, and could be lowered at a moment's notice in the same way in which the chimneys are made to descend, there would be no excuse for negligence. At all events, as things are at present managed, an accident must happen sooner or later, and with that impression I venture to submit the subject to your notice.

J. O. HALLIWELL.

ASSISTANT ENGINEERS' AND DRAUGHTSMEN'S BENEVOLENT ASSOCIATION.

SIR,—As there is every possibility of the above society being set on foot, I should like to ask Mr. R. M. Bancroft, as the promoter, what he thinks the amount of subscription per member would be? I would also suggest the desirability of opening branches throughout the country. I think, if Mr. Bancroft would explain the advantages that would accrue to members joining such an institution it would incite others to take it up, and so help the society forward more speedily.

T. T.

ANOTHER correspondent says, How is it intended to deal with country subscribers?

STONE *v.* BRICK.

THERE are few facts connected with architectural progress more satisfactory to contemplate than the substitution of stone for brick as a building material, not only in public but in private buildings, and in those parts of the country where stone is not indigenous as well as in London. This fact is rendered still more remarkable by another, namely, that a very few years ago many architects, especially the younger members of the profession, were strongly and zealously advocating, by words as well as by designs, some executed and some only on paper, the use of "local materials:" brick in the clay districts, stone in the stone districts, timber in the woodlands; and which principle, if carried out to its extreme, would compel us to build ships of oyster-shells and fish-bones. It may be as well to put forth a word or two of encouragement to those proprietors and architects who are using and advocating the use of stone in these south-eastern cities and counties of England.

In doing this we have to consider (1) the question of appearance, (2) of solidity, (3) of economy, and (4) of the moral effects on producer and consumer.

1. The first question, if a question at all, might be dismissed almost with a single word, or even an unspellable interjection; and in answer to those who like to see bright red bricks, we can point out the much more sightly effect of red granite and sandstones now in use, which in a smoky atmosphere do not attract the dirt as do porous bricks in a very few years after erection. With regard to the appearance of cement as compared with stone, when new every one can distinguish it by its muddy texture, and when about two years old by its sooty blackness.

2. The solidity of stone may be tested before its removal from the quarry; that of brick not practically till it has been not only made to form part of a structure, but has had the weight of floors, girders, and other superstructures imposed upon it, to say nothing of the superior bond acquirable in stonework. In military works the strength of resisting the severe dynamical tests to which they are exposed is found to be in proportion to the largeness of the materials of which they are built and the simplicity of their construction; for while the Egyptian barracks and other fort works, consisting of 6-ft. granite walls, supporting, by medium of 18 in. by 6 in. oak joists, 12-in. floors of the former material, are shell and shot-proof, our brick-material towers are not at the present day worth a single pinch of snuff.

A careful examination of buildings of different ages, built in the two materials whose relative merits we are discussing, and this only, will show us the advantage that stone has of resisting age, or other destructive influences. Bricks, tiles, glass, and earthenware are as much subject to decay, and more so, than stone, marble, and granite. The plate, or cup, or glass that breaks when we let it fall on the floor, breaks where it was beginning, and hitherto imperceptibly, to *decompose*.

3. Taking a broad view of economy, there is more stone under the super-soil than there is clay. And clay is taken from those lands whose surface is already quite near enough to the level of the sea or the river. And we sink our basements to an unwholesome depth to acquire the earth to build our houses with, instead of helping to level rocky impediments to agriculture on the other side of the island. Again, we shall, many of us, live to see brick houses that we can remember being newly built, sink to half their original value from the decay of their materials, and the unequal sinking of their foundations. This latter condition can be prevented with a stone construction; not so with brick. Where are the brick houses, or at least nine-tenths of them, erected immediately after the fire of London? The answer to this question will show us that brick is barely fit to hastily rebuild an old city after a general conflagration, when there is not time enough to consider the systematic re-arrangement of its streets.

4. The disappointing beggarliness of many of our supposed interesting towns drives many an expectant visitor to them to spend his excursion-day in frivolous and vicious amusements. It is an indisputable fact, and the cause is equally indisputable, that the ugliest towns contain the greatest proportion of the haunts of vice. One who has visited a dozen important towns in different parts of England will be able to confirm this assertion.

When we enter an externally clean-looking building, we can always perceive much more clearly whether its internal condition in that respect agrees with its external. But we enter our dingy brick house, upon the exterior of which our eyes have been fixed since we turned the corner of the street or square in which it is situated, and do not perceive half the possible dirtiness of its interior. And we all know the connexion between cleanliness and morality, and have herein already discussed the relative superiority in that respect of stone as a building material. And thus much for the moral effects of the use of this or that material as regards the consumer. It remains only to consider their effects as regards the producer.

A stone-quarry is a very interesting sight, and worth going to see, whether or not at the time that the different operations of removing the stone are in progress; and there is nothing offensive or unhealthy either to the spectator or the workmen employed.

A brick-kiln is both unwholesome and nauseous and dirty. Stone-quarrying is instructing and elevating. Hugh Miller's "Old Red Sandstone" was written by a quarryman. When is our brickmaker's work on geology going to make its appearance? The relative cleanliness, enlightenment, and morality of the two classes of workmen—the natural result of their respective employments—is too well known to need investigating; we shall find a very correct portrait in

"Bleak House" in the brickmaker of St. Alban's. The highest summit of the working bricklayer's ambition is to be a master builder—little more than a mere capitalist: there is now nothing in his craft to raise him beyond this. The working mason, on the contrary, will, independently of his connexion with other trades, find ample opportunities in his own of developing the genius of the sculptor. S.

AN AMERICAN VIEW OF THE WATER SUPPLY OF LONDON.*

COMING to London and modern times, we see this great city, with nearly three millions and a half of inhabitants, embarrassed not only in the quantity, but in the quality of her water supply. With five times the population of Philadelphia, she has in the river Thames, "the great river" of England, a supply, flowing over Teddington Weir, of just about half the volume discharged over Fairmount dam from the smallest of our two great rivers—the Schuylkill. She would literally threaten to drink up that "great river," were she not, in connexion with fifty-six other towns upon its banks, fast rendering it utterly unfit to be drunk. The degree of mineral impurity in 1854 was represented in figures as 15·52 degrees. It ranged in 1863-65, from 22 to 16 degrees; there being an improvement latterly, arising, we suppose, from a change in the sources of supply of some of the companies. The organic impurity, although increasingly perceptible to the senses, is not represented in the analysis. The mineral impurity of the Schuylkill at Fairmount is put at 6 degrees; and our chief engineer is every year reminding the authorities in his reports of the rapid increase of the sources of impurity to this river from the sewage of towns, and the filth of numerous factories of every kind, constantly multiplying on its banks.

As "the great river" of England is becoming hopelessly foul, and as artesian wells are totally inadequate to the wants of the city; as it is idle to look to surface drainage, or to streams in any of the densely-populated regions around the city; as even the Severn river, in its lower course, is almost as bad as the Thames, the question forces itself upon the authorities and property owners of the great metropolis, how this vital necessity is to be met? Is the growth of London to be arrested and its population finally scattered? and shall those melancholy anticipations of the essayist, with his famous New Zealander musing on the broken arches of London Bridge, already begin to cast the shadows of a cold reality upon the hearts of her surging and swelling millions? We seem to have found the limit of England's coal supply. About the time she has burned up all the coal she can come at, will her city populations have swallowed or hopelessly corrupted all the drinkable water within their reach?

English engineers are answering the question very hopefully for London and other great cities on the island. Far away among the remote and desolate hills of Northern Wales, where the damp winds from the Atlantic impinge upon the rocky walls, and first deliver their heaven-distilled treasures for the use of the inhabitants of earth, 171 miles from the half-famishing, half-poisoned millions of London, wise and skilful men have fixed the probable future location of the pure supplies which are to send health, comfort, and cleanliness through the streets of the metropolis. Here, the limpid streams, which form part of the head waters of the Severn, are depended on to furnish 200,000,000 gallons per day, or 50 gallons to each of the present inhabitants, with the chance of increasing the supply as it may be needed. The total cost of these great works, with the long range of aqueducts, is put at 8,600,000*l.*,—not an enormous sum when the vast nature and utility of the enterprise is considered. A gala day, indeed, would it prove for London when such a gift was put in her keeping,—an omen of better days and of true advance to the corrupt, festering masses of her poorer population. Two millions of dollars' worth of soap alone would be saved each year by substituting the soft water of the hills for the hard water of the Thames River in washing the clothes of the Londoner.

A truly grand and comprehensive scheme is at the same time broached by these English engineers, which proposes to supply Liverpool, Leeds, and a score of Northern towns, from one and the same undertaking. Copying, doubtless, the very successful experiment by which the pure Waters of Loch Katrine are brought into Glasgow, these engineers propose to apply the pure and abundant waters of two lakes in Cumberland and Westmoreland to a similar source. The mountainous ranges of these counties face seaward, and the regions showed in the years 1845-53, the extraordinary average rain-fall of 140 in. per annum; *four* times the average in this vicinity. Over the area drained by these lakes, there should, therefore, be an average daily drainage, allowing for evaporation, of 550 millions of gallons. From this immense store, in positions elevated from 400 ft. to 700 ft. above tide, it would be a simple problem to furnish those low-lying towns with a daily supply of 131 million gallons in the aggregate. The cost of the combined works would be 12,000,000*l.* sterling, the annual revenue being estimated to exceed interest and expenses of every kind.

* From a paper "On the Water Supply of Our Great Cities," by the Rev. John W. Mears. (Published by order of the Water Committee of the Councils of Philadelphia.)

CHURCH-BUILDING NEWS.

Wells.—A reredos has been presented to St. Cuthbert's church by the Freemasons. The new reredos is executed entirely of Caen stone in the style of the fifteenth century, which was adopted to harmonize with that of the church. The subject chosen for illustration was Our Lord's Supper. The design was accepted by the committee, and a model of the work was exhibited at the Royal Academy last year, and on the opening of the Paris Exhibition, Mr. Forsyth sent it with other of his works there. The permanent work, as a whole, is now in its proper position in the church of St. Cuthbert. The work is divided into three compartments, but the subject is unbroken. In a niche on the south side is a sculptured figure of St. Cuthbert, the patron saint of the church, and in a corresponding niche on the other side is a statue of St. Andrew, the patron saint of the cathedral. The sculptures are inserted in three recesses, arches, or canopies, surmounted by carved crocketed finials and tabernacle work, the spring of each canopy being adorned with carved angels bearing emblems of the Crucifixion. The sculptor, Mr. Forsyth, was assisted in the architectural design by Mr. W. Smith, of London. The whole of the chancel has been laid with Minton's encaustic tiles, graduating from comparative plainness in the west to more elaborate in the east. The steps are of dark lias, polished. Another addition to the chancel is the polished oak communion-rail, supported by four standards of hammered iron enriched with brass. There are also two side screens of hammered iron, by Mr. Cornell, of Cheltenham. Mr. Forsyth, who is a member of the craft, has executed the sculptures at cost price, viz., 250*l.* (the price to other parties would have been 350*l.* or 400*l.*), the whole of which has been provided by Freemasons. The expense of the extra work, the new altar-rail, side screens, &c., was between 150*l.* and 200*l.*, and this has been done by general subscription.

Wolverhampton.—The committee for erecting St. Jude's Church, Wolverhampton, have selected the design submitted by Mr. G. Bidlake, of Wolverhampton. The site of the church is on the Tettenhall-road; the proposed accommodation, 812; the outlay about 4,000*l.*

Wath (Yorkshire).—The chief stone of the cemetery at Wath has been laid. The architect is Mr. J. D. Webster.

Sharrow (Sheffield).—The corner-stone of the church now in course of erection at Sharrow has been laid by the Archbishop of York. The church is one of the seven proposed to be erected in the town by the Sheffield Church Extension Society, and it is being built upon a piece of land near the main road to Cherry Tree-hill. Messrs. Blackmoor & Mitchell-Withers, of Sheffield, are the architects. The cost will be about 4,000*l.*, exclusive of boundary walls and heating apparatus.

Llanbrynmair.—Efforts have been made to build a church in the lower part of the parish. The ground for the site has been given by Sir W. W. Wynne, bart., with the addition of 100*l.* grant to the building fund. The total cost will be about 1,000*l.* The design and plans for the building have been drawn by Mr. J. W. Poundley, Black Half, Kerry. The contract for the building has been taken by Mr. Harrison, builder, Montgomery.

Tilbrook (Beds.).—The church here has been re-opened. The wood screen has been displayed by the removal of the pews, and restored by the care of the Bedfordshire Archæological Society, as a brass plate on the back records. This work has been confined to the effective preservation of the loosened structure, with the addition of such few pieces only as were requisite to make it whole. No re-painting has been allowed, and the new work is clearly distinguished from the old. All the south wall has been renewed, with the upper part of the east nave wall and the northern clearstory. The old work has been imitated by the alternate use of red and yellow stone, and the gable cross reproduced after the fragments of the old design. The nave and chancel roofs are entirely new; the principal timbers, of oak, moulded, with traceried spandrels and angels alternately. The stone corbels represent angels in the nave and natural foliage in the chancel, together with shields carrying the arms of Lord and Lady St. John, the bishop, and the rector. The east window, of grisaille glass, with arms of the Passion in the tracery, is the gift of the Duchess of Manchester. A memorial window in the south chancel is by Mr. Wailes, and contains representations of the Crucifixion, the Holy Women at the Sepulchre, Mary at the Feet of Jesus, and Christ blessing the little Children. A pulpit of Caen stone is the gift of Mr. A. A. Young, of Orlingbury: it is enriched with foliage and serpentine shafts in the panels. The reading-desk, of oak, was given by Miss A. Young, of Risely, and the window in the tower by the Rev. R. Barnes, the rector's brother-in-law. The tracery of the new retinaculated windows in the south wall was presented by the Rev. B. G. Bridges, of Blackney, Lincolnshire. The whole of the church is re-seated in oak. The altar-rails are of oak and wrought iron, and encaustic tiles enrich the floor. The architect was Mr. W. White, of London. Mr. J. Wilson, of Kettering, was the contractor; and Mr. James Hudson the foreman of the works. The total cost of the restoration is about 1,400*l.*

Leighton Buzzard.—The new church of St. Andrew at Leighton Buzzard has been consecrated. It is situated at the extreme north end of the town, a locality in which both a church and a school have been long wanting. The church is of the style of the latter end of the thirteenth century, with a French element introduced. It consists of nave, north and south aisles, chancel, vestry, organ-chamber, and north-west porches. The extreme length of the building is 110 ft., the width being 74 ft. The nave and side aisles are 66 ft. long and 50 ft. wide. The tower is placed at the north-west corner of the building, and, with the spire, is 110 ft. high. The materials used in the construction of the building are the local sandstone with Bath stone dressings. All the columns are of blue Penmant. The floor of the gangway is laid with Staffordshire squares, and the sacrarium and chancel with encaustic tiles, manufactured by Messrs. Dering & Hargreaves. The whole of the woodwork, including the pulpit, is of red deal stained and varnished. The pulpit was designed by the architect, and was to have been of stone, with five panels containing seated figures of our Lord and of the Evangelists. The centre panel would have contained the Saviour, and in the other four panels would have been figures of the Evangelists in the act of writing the gospels. The pulpit was actually executed, but some members of the building committee objected to it and it was laid on one side, the present wood one being substituted for it. A similar remark may be made with reference to the reredos, which has also been dispensed with. The timber in the roof is all displayed, and the roof of the chancel is boarded, with moulded ribs and bosses at the intersections. The architect is Mr. J. E. Nesfe, of Bristol; and the work has been executed by Messrs. Garridge & Holderstock, of Leighton. Mr. Joseph P. Stevens has been clerk of the works. The carving was executed by Mr. Margetson, of Bristol. The contract was for 2,840*l.*, but the total cost will be about 3,000*l.*

Pentonville (London).—The district church of St. Silas, Pentonville, has been consecrated. Recently, through the assistance of the Bishop of London's Fund, an arrangement was made with the Rev. Dr. Courtenay, of St. James's, Pentonville, to secure for this mission district the building lately erected and known as Christ Church, Pentonville. Before, however, it could be consecrated, there remained to be raised the sum of 3,250*l.*, toward which amount the Bishop of London's Fund contributed 1,400*l.*, and since then other friends have given about 1,100*l.*, still leaving about 750*l.* to be raised. The building

had been previously opened by license. In addition to this there is a site secured for schools, for the erection of which about 900*l.* have been raised, and it is reckoned that, for about 700*l.* more, suitable school premises may be built. It is proposed, as soon as possible, to raise the sum of 750*l.* still required for the church, and 700*l.* for the erection of the schools, which are urgently needed.

Weston-under-Penyard.—The parish church has been re-opened, after undergoing a restoration. An erection on the south side, hitherto used as a vestry, has been removed. An ancient south doorway has been opened out, and a new organ-chamber and vestry have been added on the south side of the chancel. The window-frames of former days have been removed, and the window-openings filled in with tracery of the fourteenth century, and some new windows have been inserted. A new chancel-arch and screen-wall have been built of local red stone, and a new sedilia, in the architecture of the fourteenth century, of Forest of Dean stone, has been inserted. All the internal and external masonry has been stripped of the plaster and whitewash, and restored. The chancel has had a new roof. The windows are glazed with tinted glass. Stained glass has been inserted by Messrs. Heaton & Co., of London, in the triple-lighted window in the east end, and a stained-glass window, by Messrs. Clayton & Bell, has also been put in at the west end. The chancel and nave are paved with encaustic tiles. The reredos has been supplied by Mr. Earp, of London. There are open seats of varnished deal in the body of the church, those in the chancel being of carved oak. The architect employed was Mr. G. E. Street, of London; and the work has been executed by Messrs. Collins & Collins, builders, Tewkesbury.

Bredhurst.—The church of this parish, which has long been in a dilapidated state, has lately been restored and enlarged at a cost of between 1,600*l.* and 1,700*l.*, under the superintendence of Mr. E. Christian, at the sole expense of Mr. T. H. Day, of Frindsbury, father of the present incumbent. The old nave has been pulled down and a new one built, and a new arch now takes the place of the small one which formerly divided the nave and chancel. The chapel on the south side of the chancel, which for years has been separated from it by a lath-and-plaster partition, has been again thrown open, and the east windows filled with stained glass by Messrs. Cox & Son, to the memory of the little daughter of the present incumbent, given by her godmother. The chancel windows have also been filled with stained glass, by Messrs. Clayton & Bell. The floor of the chancel is paved with tiles. The whole work has been executed by Mr. W. Vaughan, of Maidstone.

DISSENTING CHURCH-BUILDING NEWS.

Eastwood.—The Committee for erecting a new Congregational Chapel at Eastwood, Nottinghamshire, have selected the design of Messrs. Bidlake & Tait, architects, of Leicester.

Brighton.—The foundation stone of a Congregational new chapel has been laid in Cliftonville. The edifice is situated at the north-west corner of Ventnor Villas, at the top of George-street. It is being built by Mr. C. E. Kemp, of Brighton, from designs furnished by Mr. Horatio N. Goulty, also of Brighton, architect. The style is Early English, faced with Kentish rag, with Bath stone dressings. There are to be six lancet-shaped windows on the north and south sides of the building; and in the principal frontage, in Ventnor Villas, there will be one large central window, triple-pointed, but divided into four lights; and beneath this window, between the entrances (which are to be north and south of it), will be a piece of fret-work in Bath stone. It is built to accommodate 400 persons on the ground floor. There are to be no galleries at present.

Kidderminster.—The chief stone of a Baptist chapel and schools has been laid here. The new building will be in the Gothic style, and is from a design by Mr. Bidlake, of Wolverhampton. The entrance from the street will be by a flight of steps right and left, opening into a corridor which runs along the front of the chapel, and is lighted by seven small windows. On what may be called the ground floor there is a school-room, 30 ft. by 40 ft., and 11 ft. high, and also four class-rooms of various dimensions. The chapel is above these, and extends further to the rear than the area they occupy. It will be 68 ft. in length and 40 ft. in breadth. The height from the floor to the wall plate is 22 ft., and the roof rises steeply above, and will be left open in the interior to two-thirds of its height. The platform in the chapel is to be 14 ft. by 8 ft., and the baptistery 12 ft. by 3½ ft. There will be a gallery at one end of the interior 40 ft. by 20 ft., and an organ-loft 24 ft. by 12 ft. Three vestries will be provided. The fabric is to be of red brick and white Alveley stone, intermixed with blue-brick bands and arches. A window will be at the end of the chapel nearest the street. The edifice will hold from 750 to 800 persons. The total cost, including site, is estimated at 2,000*l.* The builders are Messrs. Scholes & Warrington. Mr. J. Wilkinson is clerk of the works.

Liverpool.—A new Wesleyan Methodist chapel, at Fairfield, has been consecrated. The edifice, which has cost about 8,000*l.*, has been built at the joint expense of Messrs. Daniel and Joseph Leather. The chapel, which stands in Laurel-road, is built in the Decorated style, with windows filled with flowing tracery, each window being of different design, and some of the larger ones having shafts with moulded bases, carved caps, &c. The plan of the building is cruciform, comprising a nave and transepts, with chancel and chancel aisle. The west gable is filled in with a deep sunk arch, moulded and carved; the inner part of the arch being occupied by a large traceried five-light window. The west porch faces Laurel-road, and the chapel is also entered by a porch on the south side. Separate entrances are provided for the transepts, north and south. The transept gables have traceried windows above the gallery level, and a row of three smaller ones below. The walls throughout are built of Yorkshire parpoints, with dressings of Stourton stone. The roof is slated with dark slates, interspersed with light green bands, and ventilators are fixed in the ridge. In the interior the nave is 76 ft. long by 43 ft. wide, with 42 ft. to the highest part of the ceiling, which is wagon-headed; the top part of the roof being shut off, which, it is said, gives an equal temperature and good acoustic results. The transepts are 17 ft. deep and 26 ft. wide, with a gallery in each, supported by brackets. The chancel is 20 ft. wide and 27 ft. deep, and opens into the nave with a stone arch and jambs, moulded and carved. The organ chamber is on the north of the chancel, and the entire east end is occupied by a large five-light window, with tracery and stained glass, continued to the floor by a reredos of Caen stone, with moulded arches, carved spandrels, caps, &c., and polished marble shafts. The floor of the chancel is laid with encaustic tiles. The pulpit, which stands on the one side, is of Dantzic oak, relieved by brown oak pillars, and supported upon a Caen-stone base with shafts of polished marble; and on the other side is the reading-desk, also of Dantzic oak. The chancel is filled on each side with stalls for the choir. The whole of the timber work is pitch-pine. The roof is stained, and is in one span, so as to avoid columns of any kind. The east and west windows are "memorials," stained by Mr. Wailes, of Newcastle. The other windows have opaque cathedral-tinted glass, with white margins. In addition to the chapel there are several vestries, lavatories, &c., and a large school or lecture room entered from the south side, and capable of being used independently of the main building. The design was by Mr. C. O. Ellison, architect, under whose supervision the buildings have been completed. Messrs. Burroughs & Sons were the contractors for the work; and the masonry was done by Mr. Black; the painting, plumbing, and glazing by Mr. Holt; and the slating, plastering, &c., by Mr. Callaghan. The carving was by Mr. G. Shaw, and the base of the pulpit and the reredos by Mr. Stirling.

Redland.—A Baptist Chapel is being erected from the design of Mr. S. Hancorn, of Bristol and Newport, architect. The design was chosen out of several others submitted in limited competition. The builders are Messrs. Marquis & Munro. Mr. Hotham is the clerk of works. The design is in the Decorated style of Gothic, and includes the chapel, with transepts; vestibule, with two lobbies in connexion therewith; open porch; chancel, with baptistery underneath and organ recess on one side the same; minister's and deacons' vestries with private entrance, and ladies' vestry with private entrance, and underneath the heating apparatus. An end gallery is also proposed over the vestibule and lobbies, with stone staircases leading thereto. A tower is included in the design, but it is not intended at present to carry it higher than necessary for the stairway. The principal front faces White Ladies-road, from which the chapel floor will be raised about 3 ft. 6 in., and attained by a flight of broad, easy steps extending the entire length of the porch (26 ft.). A five-light traceried window is intended to be placed in the principal gable, and three-light traceried windows in each transept. The chapel will be further lighted with two-light traceried windows, with gables over same, at the side. The roof of the chapel will be in single span. The seats are proposed to be of pitch pine, and low with sloping backs. The walls of the chapel will be stuccoed, and have a string of encaustic tiles above the pews. The elevations of the edifice will be faced with Pennant stone in random-ranged courses, tuck pointed. The roof will be covered with Bangor slate, alternating in plain and ornamental courses. Cathedral glass, in patterns with two tints, is proposed for the windows. The floors of the vestibule and lobbies are intended to be paved with encaustic tiles. The chapel will be both heated and ventilated by Messrs. Haden, of Trowbridge. The contract has been taken at 5,652*l.*, and it is thought the tower can be completed for about 800*l.* additional. The chapel will accommodate 580 persons.

Derby.—A new Congregational Chapel is about to be commenced here. Messrs. Bidlake & Tait, of Leicester, are the architects. New Presbyterian churches are also about to be erected from the designs of the same architects.

Greengates.—The foundation-stone of a new Wesleyan chapel has been laid at Greengates, a populous neighbourhood near Apperley Bridge. The style adopted is Early Gothic. The edifice will be entirely of stone, and the roof and fittings of deal, stained and varnished. The size within the walls is 53 ft. 10 in. by 36 ft., and the height from the floor to the wall-plate at the eaves, is 17 ft. 3 in. The roof is open nearly to the ridge, and the timbers and bindings are dressed. The seats are low benches, with small doors, and will accommodate on the ground-floor, including the free seats, 360 persons. A small gallery crosses the end of the chapel, over the entrance-lobby, which will accommodate about sixty persons, making a total of 420, all seated. The building is to be heated with hot water, and ventilated. A small vestry is attached to the further end of the building, in the same style as the chapel. The contractors are,—for the masons', joiners', and plasterers' work, Mr. Robert Sugden, of Keighley; for the slaters' work, Mr. Smithies; for the plumbers' and painters' work, Mr. J. Garth, of Idle. The architects are Messrs. Milnes & France, of Bradford. The estimated cost is 1,700*l.*

Falmouth.—A large building, erected by the Wesleyans at Pike's-hill, has been opened for public worship. The new building is of Gothic architecture. The architect is Mr. Lander, of Bristol; the builder, Mr. Blatchford, of Tavistock. It contains sittings for about 800 persons, and the total cost is 2,500*l.*, of which about half has been raised. The chapel is ceiled internally to the vaulted form of the swept timbers of the roof, the ceiling springing from a wood cornice to the height of 38 ft. from the floor. At the intersection of the roof is fixed a sun-burner, having fifty jets, the gift of Captain Edmund Hancock, of Falmouth, which illuminates the whole of the chapel, excepting directly under the galleries. Daylight is afforded by three large five-light windows and one large wheel window, all traceried. A neighbouring owner of property has blocked up one of the windows on the outside by some brickwork.

STAINED GLASS.

Farsley.—This church, which has been closed for some weeks, has been re-opened. Five windows have recently been placed in the chancel, in memory of the late Rev. Samuel Marsden, a native of Farsley, known for his missionary labours in Australia and New Zealand, and for the services he rendered in establishing the Australian wool trade with this country. The windows are of stained glass, and are the work of Mr. Wailes, of Newcastle. The subject of the principal window is the "Good Shepherd." The expense of the memorial has been raised by public subscription. The nave has also received the addition of three stained windows at private cost. One of them is to the memory of children of the Rev. Parsons J. Manning, the incumbent.

St. Luke's, Maidenhead.—A stained-glass window has lately been placed in the south side

of the chancel of this church. The window was designed and painted by Messrs. Lavers & Barraud, of Bloomsbury. There are two groups in the window, the subjects of which are taken from the Gospel of St. Luke: one from chap. viii. 47. The woman who had touched the border of our Lord's garment is represented in a kneeling posture, and confessing to Him what she had done. The other, from chap. xviii. 42, our Lord giving sight to the blind man. This is the first stained window placed in this church.

Micheldever Church.—The memorial window in this church to the late Lord Northbrook is now completed. The stonework, executed in Bath stone in the Decorated style, and consisting of three lights with tracery, is by Messrs. Newman & Son, of Winchester. The stained glass representing the "Crucifixion" and "Good Samaritan," with the emblems of the Apostles, is by Messrs. Clayton & Bell, of London. Mr. John Colson, of Winchester, was the architect.

SCHOOL-BUILDING NEWS.

Tupsley.—The foundation-stone of the parochial schools for the parish of Tupsley has been laid. The first undertaking, after making provision for the newly-appointed incumbent, was the building of a parish church at a cost, we believe, of from 2,000*l.* to 3,000*l.*, and the parishioners decided upon erecting a master's house and schools for the education of the children of the poor parishioners. The building, which is being erected by Mr. John Davies, builder, Leominster, under the superintendence of Mr. F. R. Kempson, architect, will consist of master's residence and schools. The latter will consist of two large rooms, one for boys and the other for girls, with cloak-rooms, porch, &c. The building will be composed of native stone, with Bath stone dressings, the interior being of brick. The contract sum for erecting the building is about 800*l.*

Hanley.—The new school for boys, with master's house, in connexion with Wellington Church, has been opened. The school-room forms a right wing to the original school-room. It is 46 ft. by 18 ft., and has been built by Mr. R. Hammersley, from the designs of Messrs. Palmer, architects. The total cost was 457*l.*

Books Received.

The Fouling and Corrosion of Iron Ships; their Causes and Means of Prevention. By C. F. T. YOUNG, C.E., London Drawing Association, Adelphi. 1867.

THE fouling and corrosion of iron ships have given great trouble in the Navy, and a satisfactory remedy, it seems, is still a desideratum. The chief object of this volume is to advocate the plan brought forward by Mr. T. B. Daft, C.E., as in all respects the soundest, simplest, and most practical. The author endeavours to prove that it is in all respects capable of fulfilling the requirements sought to be obtained; but this is not a subject we can now enter on.

The Alps and the Eastern Mails. By Sir CUSACK P. RONEY. London: Wilson, Royal Exchange.

THE question of the best route to the East is here ably discussed. Sir Cusack Roney thinks, so far as regards the European portion of it, that the interest of England ought undoubtedly to lean towards the Simplon, and not towards the St. Gothard. Nevertheless, as he remarks, the Mont Cenis route, with the summit railway, will, according to Captain Tyler's calculations, show a gain over the Marseilles route of 39¼ hours, and of 42½ hours after the completion of the tunnel line from St. Michel to Susa. The accelerations and alterations suggested by Sir Cusack would be important improvements in the great line of communication which connects the mother country with the whole of her Eastern possessions, and with the great commercial empires that lie farther eastward even than India. His pamphlet should have attention.

VARIORUM.

THE *Quarterly* contains more than usual to engage attention from our special point of view, "New Paris" (less as to its buildings, on which sixty millions sterling have been spent in fifteen years, than its manners and arts), "Cornish Antiquities," "Agricultural Gangs" (with their proper condemnation), and "The New Courts of Law." The article in which the latter subject is dealt with is a piece of indiscriminate abuse of all the designs submitted. The writer proposes that the Strand front should consist of a range of houses and shops crowned with gables designed "by a dozen or a score of our best Gothic architects;" that the site should be enlarged so as to take in the whole ground from Chancery-lane to Newcastle-street, and from the Strand to Carey-street; and that for the courts themselves, Gothic architects of proved ability should be invited, without previous restriction of number (twenty-four or even thirty), to confer and settle the general plan of the buildings;—"while each architect would assume the initiative in designing his own separate portion, every part might be subject to such critical judgment of the entire number as would ensure the harmonious combination of the whole work." "The initiative of one architect for each court will give that individuality and variety which we have shown to be so essential; while a thorough harmony of effect will be secured through the general co-operation of the architects!" When we add that, according to the writer, there is to be no "design," but that the buildings are to "grow," we shall have made obvious the thoroughly practical nature of the article.

Miscellanea.

HEALTH OF NEWCASTLE-UPON-TYNE.—Typhoid fever has again made its appearance in the eastern part of Newcastle.

MORTUARIES AND POST-MORTEM ROOMS.—The Marylebone vestry have decided that, in addition to a mortuary-house, a *post-mortem* examination house shall be built. It is to be hoped the example will be followed.

TUNNELLING ON THE GO-AHEAD SYSTEM.—The Californians, who are working through their Summit Tunnel in the Sierra, have accomplished 1,000 ft. of the 1,660 ft. since last September. They not only began at both ends, but sank a shaft in the middle, and worked both ends from that.

BUSINESS AND AMUSEMENT COMBINED.—Pike's new opera house, now being built in Cincinnati, will be five stories high, with a frontage of 170 ft. The lower story is divided into six large stores. There are one hundred rooms on the second-floor, and a concert-hall 70 ft. wide and 128 ft. long. The remainder of the building is divided into rooms for mercantile purposes. The cost of the building will be more than a million dollars, and it is estimated that the total annual rent will amount to 150,000 dollars.

THE FEMALE SCHOOL OF ART.—The first gold medal given by her Majesty, to be competed for annually by the students of the Female School of Art, 43, Queen-square, has been awarded to Miss Alice Manly, for three groups of flowers, painted *in tempora* from nature. The adjudicators were,—Mr. Westmacott, R.A., Mr. Cope, R.A., and Miss Moutrie. Miss Manly has also obtained this year a national silver medal, given by the Science and Art Department. We have before now commended her work.

SALE OF LAND BY AUCTION.—The new Act for amending the law of auctions of estates is to take effect on the 1st proximo. Where sales are invalid in law they are also to be invalid in equity, there being at the present time a conflict between law and equity in respect of the validity of sales by auction of land where a puffer had bid, although no right of bidding on behalf of the owner was reserved. With regard to the rules respecting sales without reserve it is enacted, "And whereas, as sales by auction are now conducted, many of such sales are illegal and could not be enforced against an unwilling purchaser, and it is expedient for the safety of both seller and purchaser that such sales should be so conducted as to be binding on both parties, be it therefore enacted, by the authority aforesaid, as follows:—That the particulars or conditions of sale by auction of any land shall state whether such land will be sold without reserve, or subject to a reserved price, or whether a right to bid is reserved; if it is stated such land will be sold without reserve, or to that effect, then it shall not be lawful for the seller to employ to bid at such sale, or for the auctioneer to take knowingly any bidding from any such person."

GLUE FOR METALS.—A good glue for metals may be made by mixing with sixteen parts of melted glue one part gum ammoniac, and then adding one part of saltpetre acid.

ALUMINIUM BRONZE.—This alloy, in which aluminium takes the place of the tin contained in common bronze, is becoming daily more and more important in the metal trades.

THE CHISEL.—Sir: Can any of your correspondents inform me when the chisel was first introduced into this country? My impression is, that it was in the eleventh century.—FREEMASON.

NEW NATIONAL GALLERY ACT.—The New National Gallery Act is issued. Under the former one the Commissioners of Public Works were to acquire land for the enlargement and improvement of the National Gallery by agreement. No agreement had been made with the owners, and it was necessary to provide for the compulsory purchase of the land. Compensation is to be given for the purchase of the parochial schools of St. Martin-in-the-Fields. A copy of the lands required is to be deposited at the office of the Commissioners of Public Works, and to be open to the inspection of the public.

SANITARY INQUIRY AT EPPING.—One of the Government inspectors, Mr. A. Taylor, has been sent down to Epping to make sanitary inquiries in consequence of a complaint made to the Home Secretary to the effect that the sewer authority for the town had failed to properly drain the town, or supply its inhabitants with a sufficient quantity of water. The inspector has heard evidence on the subject, which goes to show that the whole drainage of the town is on the cesspool system, and that it is surrounded with field-ditches, which evaporate noisome stenches most injurious to the health of the place. An abundant water supply, it is said, can be had in the neighbourhood.

HEALTH OF LIVERPOOL.—The official report by Dr. Trench, the borough medical officer of health, on the health of Liverpool during the March and June quarters of the present year, has been printed. During these quarters there were registered 7,285 deaths in the borough, making its death-rate equal to 29·5 per 1,000 per annum of the inhabitants. This shows a decrease of 2,825 deaths as compared with the corresponding period of 1866, and of 1,141 deaths as compared with the corrected averages of the last ten years. Of the total deaths, 3,858 were males, and 3,427 females, and 3,230, or 44·4 per cent., were children below five years of age. Zymotic diseases occasioned 1,368 deaths, being a decrease of 630 on the corrected averages of the last ten years, and 1,713 on the number registered under this class during the corresponding period of 1866. This gratifying diminution in the range of contagious diseases was chiefly observed in those affections such as typhus, diarrhœa, and small-pox, which are supposed to be either directly or mediately amenable to the influences of sanitary regulations.

WAVERTREE URNS.—The discovery of cinerary urns at Wavertree, similar to those found in the celebrated Derbyshire grave-hills and elsewhere, is referred to in a letter written by Mr. H. H. Vale, of Liverpool, architect. These urns are sun-baked, and not made by the potter's wheel. They are discoloured by smoke, as if burning matter had been put into them. Other finds of a like order in barrows and grave-hills, of pre-Roman and pre-Saxon origin, lead to the idea, remarks Mr. Vale, that "elevated sites were usually selected by the prehistoric races who inhabited this island for their interments, and the existence of Druid stones at Calderstones, upon which Sir J. Y. Simpson reports the indications of emblematical circles, and the finding of these urns at Wavertee and Roby, proves that this district of Lancashire was inhabited ages before the arrival of the Roman legionaries upon our shores. It is a peculiar feature of these ancient barrows that the British interments are frequently found underneath those of the Saxons, leading one to suppose that the places of burial were consecrated, and had been from time immemorial, and not merely haphazard interments on elevated situations, but cemeteries used by succeeding races. These grounds may have been consecrated thousands of years ago by the priests of a religion which has reached us only in those mysterious incised emblems which are at present exciting the attention of our best archæologists."

THE CHATHAM SURVEYOR.—At a recent meeting of the Local Board of Health, a gratuity of 20*l.* was unanimously voted to Mr. Greenstreet, their surveyor, for his services as architect of the new offices, while also attending zealously to his other duties.

IRISH ANTIQUITIES.—Within the last few days, on the farm of a man named Thomas M'Garry, residing at Aughamore, near Gravara, there was discovered a curious relic in the shape of a wooden house, which is constructed of black bog oak. It was found under water in an exhausted bog, at a considerable depth beneath the surface. It measures 23 ft. by 10 ft., and consists of eight very strong beams, ranging in length from 10 ft. to 13 ft., which are supported by cross beams of great strength, and firmly jointed. The side beams are mortised, as if intended for uprights.

THE GATESHEAD TOWN-HALL DESIGNS.—The town council have resolved—"That this matter be referred back to the Town-hall Committee, and that the architects be requested to furnish detailed drawings and specifications, to enable the council to judge of their plans; and that they then be submitted to the contractors, to enable them to state the total cost of the building;"—also, "That the council appoint a thoroughly competent person to make an inquiry into the plans and specifications, after the contractors and architects have gone over the plans."

THE LONDON GAS COMPANIES.—The progress of the metropolis gas question has arrived at a sudden conclusion. Various objections were made by the companies; and the chairman said that, this being the case, the committee would not proceed any further with the Bill, but would report their opinion to the House. He regretted that this long and, doubtless, very expensive inquiry had led to no further result at present; but he hoped, by the next session of Parliament, the companies would be able to introduce a Bill which would be considered satisfactory,—a singular termination, surely!

ADOPTION OF THE MAIDSTONE MAIN DRAINAGE SCHEME.—The town council as the local Board have resolved by a majority of ten to four, "That the plan of sewerage, recommended by the surveyor in his report of 21st January, 1867, as modified by Mr. Lawson in his report of the 13th May, 1867, be carried into execution, and that application be made to the Local Government Act Office for power to borrow, on mortgage of the rates, the sum necessary for the purpose, and also for statutory powers to purchase the requisite land, and that the drainage of the West Borough and Kingsley Estate be at once proceeded with."

ROYAL PRINCESS'S THEATRE.—Mr. Herman Vezin, one of the few actors left us capable of refined expression and the portrayal of delicate differences of feeling, has opened this house for a brief season with a new play by Mr. W. G. Wills, titled "The Man o' Airlie." The play is well conceived, well written, and well acted; but that it has in it the qualities needed to ensure a popular success we cannot say so positively. It is, however, just one of those experiments that deserve the support of every earnest lover of the drama. Mr. Vezin plays a difficult part with great ability, and is well supported by Miss Nelly Moore, Mr. H. Forrester, Mr. E. Price, and Mr. Maclean, especially the latter.

CUMBERLAND AND WESTMORELAND ARCHÆOLOGICAL SOCIETY.—The members of this society have held a meeting in the Crown Hotel, Penrith, to hear three papers read, and to visit Brougham Castle, Yanwath Hall, and Maybrough. The Chairman, Mr. Brown, of Tallentine Hall, briefly opened the proceedings. The Rev. J. Simpson read a paper sent by the Rev. J. Maughan, of Bewcastle, with the title,—"Was Lanercost a Roman Station?" The Rev. J. Simpson then read a paper on "Brougham Castle," and the weather having cleared up, a large party departed in conveyances to visit and explore the objects of archæological interest in the neighbourhood indicated. On reaching Yanwath Hall, Dr. M. Taylor read a paper whilst standing on the scene of his subject. The society passed a vote of thanks to Lord Lonsdale, for his permission to visit and inspect the ancient apartments of Yanwath Hall. The company then proceeded to Brougham Hall, through the chapel, and then on to Brougham Castle. The visit to Maybrough was postponed until a future day. On the return from the excursion the members and friends partook of tea together at the Crown Hotel.

BOROUGH SURVEYORS AND PRIVATE PRACTICE. After much discussion it has been decided by the Council of Derby that the town surveyor may carry on his private practice.

BUILDING PROGRESS AT SUTTON.—The foundation-stone of some houses has been laid on the Rose-hill Park estate, which is planned out for the erection of houses. Mr. J. D. Hayton is the architect. Under the stone were laid various English, Belgian, and French coins.

ROYAL GALLERY OF ILLUSTRATION.—We willingly comply with a request to mention that Mr. German Reed will bring his season to a close on the 5th of August, when there will be a benefit for himself, Mrs. Reed, and Mr. John Parry. To a "Dream in Venice," got up as it is with care, and enriched with capital scenery, and "Merry Making," will be added other attractions on that night.

JASPER.—Jasper is now procured, to almost any required extent, at St. Gervais, in Savoy, where the quarry has a surface of at least 24,000 square yards, and a depth of about twenty-two yards. It is a variety of quartz, which is characterised by being opaque, and is of various colours. It is an excellent material for ornamentation, whether as stands for small objects, or as panels and columns, to be used by the architect.

THE BRICK-KILN NUISANCE: BRICKS MADE WITH SEWAGE.—In the Chancery Court, before Vice-Chancellor Stuart, the case of Luscombe *v.* Steer, was a motion to restrain the defendant from making bricks in a field of his, lying between the plaintiff's property and the Crystal Palace line of the London, Brighton, and South Coast Railway. The defendant, in making bricks, it was said, used water from a sewer into which four houses poured their refuse. The plaintiff contended also that the defendant was not entitled to make bricks on the land. The defendant denied that he was guilty of committing any nuisance. His field on the plaintiff's side of the railway was nearly half a mile from the house of the plaintiff, who, when he became tenant of his property, was fully apprised of defendant's rights. The Vice-Chancellor granted an injunction to restrain the defendant from making bricks to the damage or annoyance of the plaintiff.

THE CLERKENWELL MORTUARY.—At a recent meeting of the vestry, the clerk said he had received a letter from the Coroner of Central Middlesex, containing the presentment of a jury who sat at the Queen's Head, Princes-street, to inquire into the cause of the death of a person whose body lay, in a putrescent state, in an overcrowded house in Pentonville, in consequence of the public mortuary being closed, to the serious inconvenience of the medical officer whose duty it was to make the post-mortem examination, and to the danger of the health of the inmates of the house. The jury expressed themselves in the strongest terms against the closing of the mortuary. It was agreed that a copy of the resolution of the jury be forwarded to Mr. Boodle, the agent of the Marquis of Northampton, who had closed the mortuary, to the Marquis himself, and to the special committee recently appointed by the guardians to take steps for the re-opening of the mortuary chapel.

FRUIT WITHOUT STONES.—A new horticultural process has been described by the Rev. F. Firminger, at the last meeting of the Agricultural Society in India, whereby, it is said, the stones of fruit may be reduced or made to disappear, and the pulp be increased in size and flavour. During the cold season (says the *New York Tribune*, in giving an account of the process) select a branch that is to be used afterwards for inarching. Split it up carefully somewhat less than a span long. From both halves of the branch thus split scoop out clearly all the pith; then bring the split halves together again, and keep them bandaged till they have become thoroughly united. At the usual time, inarch the branch thus treated upon suitable stock, taking for the place of union the portion of the branch just below where the split was made. Upon the branch of the tree thus produced a similar operation is performed, and so on for successive seasons; the result being that the stone of the fruit becomes less and less after each successive operation. This process, it is added, has been applied likewise to the grape vine at Malaga; and plants thereby have been produced which bear the finest fruit, without the slightest vestige of a stone within them.

A GIFT.—Mr. Titus Salt, the proprietor of the well-known alpaca manufactory at Saltaire, has just made a magnificent offer to the borough of Hull. He proposes to give 5,000*l.* to the Sailors' Orphan Institution connected with the Port of Hull Society, on condition that the institution be enlarged, to give accommodation for 100 orphans, and the school 200.

HOUSE DECORATION: PRIZES.—It is due to Mr. George Dobie, of Edinburgh, to draw attention to an advertisement which has appeared in our columns in which he offers prizes for designs in drawing-room wall-decorations. This is likely to encourage and develope talent, and it is also the best way to promote self-interest as well as public taste in house decoration.

OLD FILES.—Old and worn-out files may be perfectly renovated by first cleaning them from grease with a hard brush and a concentrated solution of soda; placing them in a dish containing water; adding to the latter an eighth part concentrated nitric acid, and mixing well by agitation; then leaving them at rest for five-and-twenty minutes; next withdrawing them, washing them with water, and brushing them, replacing them in the dilute acid, to which is added a second eighth of nitric acid, and letting them lie for 50 minutes, then again brushing them and replacing them in the bath, to which a sixteenth part concentrated sulphuric acid has been added; finally washing in pure water and milk of lime to remove all traces of the acid, and drying.—*Scientific Review.*

CHIMNEY TOPS OR COWLS.—The improved chimney top or cowl, patented by Mr. G. Whitehead (Nov. 13, 1866), is made by preference in two parts, one fitting over the other. The inner portion or part is made by preference of an octagonal shape, but it may be round, square, or of any other shape. For the sake, however, of clearness, the patentee describes it as being octagonal, the top being covered with a cap, and made by preference somewhat conical. The outer part, which fits over and rests on the inner, is made of a shape to correspond therewith, and is open at top, terminating in a sort of crown or canopy. Ribs are brought from the top of the cap down the eight corners to half way down, or thereabouts, the top or cowl. In each square formed between the ribs there are by preference three apertures, preferably square, for the smoke to escape, which can either ascend or descend, according as the wind may affect the draught. There are cross pieces from rib to rib, which act as shields to prevent the action of the wind when blowing down affecting the draught.

EXHIBITION OF WORKS OF ARTS AT LEEDS, 1868.—It is stated that there will be three galleries devoted to the old masters, each measuring about 120 ft. in length. For the English School there will be two galleries, each 110 ft. long, besides the gallery set apart for water-colour drawings, which is also 110 ft. long. But perhaps one of the most important features will be the large gallery for the pictures of foreign painters of the various schools, including those of America, lately so distinguished in landscape art. In addition to the principal galleries above referred to, there will be one of the same size filled with engravings and drawings by old masters; an extensive portrait gallery of Yorkshire worthies, round the corridor of the central hall, with rooms for miniatures, and a complete museum of ancient ornamental art. The spacious staircases and halls, in themselves highly ornamental, will be made available for pictures as well as for picturesque decoration of every kind in the shape of tapestry, trophies of arms and of the chase; while the principal examples of Scripture will be arranged round the central hall and in the picture galleries.

TENDERS

For alterations and additions at No. 6, Royal-crescent, for Mr. G. S. Kempson:—

Nell & Tuxford (accepted)	£470 0 0

For extensions and alterations at Bethnal House Asylum, Bethnal-green, Middlesex. Messrs. Tolley & Dale, architects:—

Hedges	£3,250 0 0
Perry	3,140 0 0
Johnston	3,035 0 0
Forrest	2,995 0 0
Pritchard	2,937 0 0
Rivet	2,773 0 0
Ranor	2,759 0 0
Henshaw	2,699 0 0

For new sewers in Charlotte-street, Duke-street, and part of Devonshire-street, Marylebone:—

Wainright	£3,020	0	0
Wigmore	2,498	10	0
Higgles	2,429	0	0
Bloomfield	2,122	0	0
Knight & Hanswell	1,990	18	0
Robinson	1,780	0	0
Crockett	1,778	0	0
Thirst	1,679	0	0
Piggey	1,675	0	0
Dickenson	1,660	0	0
Tackrah	1,580	0	0
Harsey	1,392	0	0

For new wing, &c., to the East Sussex, Hastings, and St. Leonard's Infirmary. Mr. W. J. Gant, architect. Quantities supplied by Mr. Henry W. Broadbridge:—

Simms & Marten	£1,231	0	0
Nightingale	1,156	0	0
Sawyer	1,142	0	0
Hughes	1,124	0	0
Jones & Moyes	1,083	12	9
Broadbridge	1,070	0	0
Winter	1,065	10	0
Poxon & Smith	1,065	0	0
Gray	1,061	14	0
Kenwood	1,045	0	0
Longhurst (accepted)	998	10	0
Sadler	227	0	0

For new schools and class-rooms, New London-road, Chelmsford. Mr. Charles Pertwee, architect. Quantities not supplied:—

Roper	£3,020	0	0
Baker	1,973	6	10
Last	1,955	0	0
Brown	1,950	0	0
Ghost & Son	1,950	0	0
Thorn	1,925	0	0
Gozzett (accepted)	1,910	10	0

For a new public house (except basement) in Gaisford-street, Kentish-town, for Mr. Gaize. Mr. J. T. Newman, architect:—

Scrivener & White	£2,287	0	0
Webb & Sons	2,236	0	0
Manly & Rogers	2,200	0	0
White	2,158	0	0
Mann	2,143	0	0
Mathews (accepted)	2,040	0	0

For building baker's shop on the Lewis-road, for the Messrs. Catt. Mr. John Dallimore, architect:—

Holloway (accepted)	£475	0	0

For the erection of two houses at Streatham, for Mr. G. Pratt. Mr. Henry Jarvis, architect. Quantities supplied:—

Lost	£2,050	0	0
Nicholson	1,900	0	0
Mason	1,885	0	0
Marsland & Sons	1,867	0	0
Tarrant	1,832	0	0
Thompson	1,758	0	0
Higgs	1,657	0	0
Henshaw	1,642	0	0

For All Saints Church, Scarborough. Mr. G. F. Bodley, architect:—

Kirby	£4,511	9	0
Peacock	4,403	0	0
Smith & Son	4,373	0	1
Climie	4,100	0	0
Foster & Sexton	4,061	0	0
Setch	4,051	0	0
Barry (accepted)	3,873	0	0

TO CORRESPONDENTS.

S. H.—G. R.—C.—C. S. M.—H. P.—Cantab.—H. W. B.—J. F.—L. W. & U.—G. W. S.—Glasgow.—W. R. & Co.—W. E. S.—G. E. S.—M. M.—F. R.—J. R. (declined with thanks).—E. W. S. (an advertisement).—Wrought iron (apply to the parties).—A Subscriber (height of both buildings has been given at different times in the *Builder*).—H. Q. P. answer would depend on other points in the lease. Take proper advice).—Architect (next week).—D. H. T. (at any practical chemist's).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

Advertisements cannot be received for the current week's issue later than **THREE o'clock, p.m.** *on THURSDAY.*

The Publisher cannot be responsible for ORIGINAL TESTIMONIALS *left at the Office in reply to Advertisements, and strongly recommends that* COPIES ONLY *should be sent.*

[ADVERTISEMENTS.]

CHURCH, TURRET, and STABLE CLOCKS.—J. W. BENSON, having erected steam-power and improved machinery for clock-making, at the manufactory, Ludgate-hill, will be glad to furnish to clergymen, architects, and committees, Estimates and Specifications of every description of Horological Machine, especially cathedral and public clocks, chiming tunes on any number of bells. A descriptive pamphlet on Church Clocks post free for one stamp. Watch and Clock Maker by Warrant of Appointment to H.R.H. the Prince of Wales, and maker of the great clock for the Exhibition, 1862. 25, Old Bond-street, and 98 & 34, Ludgate-hill, E.C. Established 1749.

PARIS EXHIBITION.—Clark's Patent Steel Shutters can be seen at twenty entrances which have been fixed by order of the Imperial Commissioners, and in the Testing House by order of the Royal British Commissioners.

ADVERTISEMENTS.

In course of publication, in Monthly Parts, 2s. 6d. each; Parts 1 to 15 now ready,

VILLA and COTTAGE ARCHITECTURE. Select Examples of Country and Suburban Residences recently erected from the Designs of various Architects of acknowledged position and ability; with Descriptive Notices. To be completed in about 18 Parts, imperial 4to.

"Such a publication as this cannot but be most suggestive to all who are directly or indirectly connected with domestic architecture."—*Art Journal.*

London: BLACKIE & SON, 44, Paternoster-row.

In 1 Vol. super-royal 4to half-morocco, 28s.

THE CARPENTER and JOINER'S ASSISTANT; being a Comprehensive Treatise on the Selection, Preparation, and Strength of Materials, and the Mechanical Principles of Framing, with their Applications in Carpentry, Joinery, and Hand Railing. Also, a Course of Instruction in Practical Geometry, Geometrical Lines, Drawing, Projection, and Perspective; and an Illustrated Glossary of Terms used in Architecture and Building.

By JAMES NEWLANDS.

Illustrated by an extensive series of Plates, and many hundred Engravings on Wood.

"We know of no Treatise on Carpentry and Joinery which at all approaches this in merit."—*Mechanic's Magazine.*

London: BLACKIE & SON, 44, Paternoster-row.

Foolscap, 8vo. bound, 7s. 6d.

PEDDIE'S PRACTICAL MEASURER: a Series of Tables for facilitating the Calculations required in all the Building Trades. New edition, greatly improved and enlarged.

London: BLACKIE & SON, 44, Paternoster-row.

Just published, price 1s.; by post, 1s. 1d.

IRRIGATION in SPAIN.

By J. P. ROBERTS, C.E.

London: E. & F. N. SPON, 48, Charing-cross.

EXAMPLES OF BRIDGES, ETC. WITH ESTIMATES.

Now ready, with 50 large folding Plates 4to. 2l. 12s. 6d. half-morocco.

EXAMPLES of BRIDGES and VIADUCTS; from the Contract Working Drawings or Admeasurements of Select Works. Second Edition. To which are now added upwards of 250 Estimates; and the Practice of Setting out Work.

By W. DAVIS HASKOLL,

Author of "The Engineer's, Mining Surveyor's, and Contractor's Field Book," etc. etc.

LOCKWOOD & CO. 7, Stationers' Hall-court.

Just published, in 1 vol. crown 8vo. with Portrait of M. Chladni, and 169 Woodcuts, price 9s.

SOUND: a Course of Eight Lectures, delivered at the Royal Institution of Great Britain.

By JOHN TYNDALL, LL.D. F.R.S. &c.

Prof. of Nat. Philos. in the Royal Institution, and in the Royal School of Mines.

By the same Author, Second Edition, uniform, price 12s. 6d.

HEAT considered as a MODE of MOTION.

London: LONGMANS, GREEN, & CO. Paternoster-row.

AT the BALTIC SALE ROOM, Southsea House, Threadneedle-street, on WEDNESDAY, 7th AUGUST 1867, at TWO o'clock,

1,000 Loads Foreign and Colonial Timber,
100,000 Pieces ditto ditto Deals and Battens,
And other Wood goods.

H. FREEMAN & CO. Brokers,
3, Crooked-lane, Cannon-street, E.C.

CHARLTON, KENT.—Materials of Grove House.

MR. A. RICHARDS will SELL by AUCTION, on the PREMISES, near Charlton Railway Station, on WEDNESDAY, JULY 31, at ONE, in lots, taken down, long girders, plates, and joists, 20,000 feet of rafters and quartering, 80 squares of floor battens, moulded doors, sashes and frames, chimney-pieces, 1,000 feet of York paving, stoves, ranges, countess slates, 300,000 bricks, etc.—May be viewed. Catalogues obtained on the Premises, and of the Auctioneer, Tottenham.

SEVENOAKS, KENT.—Valuable Freehold Builder's Premises.

MESSRS. E. E. & G. CRONK have received instructions from the Mortgagees to SELL by AUCTION, at the CROWN HOTEL, Sevenoaks, on FRIDAY, AUGUST the 2nd, 1867, Sale to commence at THREE for FOUR o'clock, all that valuable FREEHOLD BUILDER'S YARD, with a frontage of 115 feet to the road, and averaging about 80 feet deep, with the whole range of timber lodges, carpenters', plumbers', and painters' shops, two 2-stall stables, and premises, all substantially built, and fitted up with gas fittings, most desirably situate at St. John's-hill, Sevenoaks, and having capabilities for carrying on a large business. Owing to the excellent railway accommodation which the town of Sevenoaks and its environs will command, it is anticipated that a large quantity of new buildings will be required for years to come. These premises therefore offer the most favourable opportunity to parties for securing a first-class builder's yard and premises, being situate nearly in the centre where the building is likely to take place.—May be viewed any day previous to the Sale, and particulars and conditions of sale may be had at the Place of Sale; Rose and Crown Hotel, Tonbridge; King's Arms Hotel, Westerham; Bell Hotel, Bromley; Lion Hotel, Farningham; Star Hotel, Maidstone; the Estate Exchange and Auction Mart, Token-house-yard, London; of G. F. CARNELL, Esq. Solicitor, Sevenoaks; and of Messrs. E. E. & G. CRONK, Auctioneers, Estate Agents, &c. Sevenoaks.

UCKFIELD, SUSSEX.—Freehold Building Sites.

MR. T. S. MARKWICK is instructed to offer for SALE by PUBLIC AUCTION, at the Maiden's Head Inn, Uckfield, on FRIDAY, the 9th day of AUGUST, 1867, at THREE o'clock in the afternoon precisely, SEVENTEEN valuable FREEHOLD BUILDING SITES, containing about a quarter of an acre each, delightfully situated on an eminence at the south side of the town of Uckfield, and within five minutes' walk of the railway station. The property lies on the western side of, and fronts to, the unpalisaded leading from Uckfield to Lewes, and commands extensive views over all the country around this well-known and deservedly favourite district.—Particulars and conditions of sale may be had on application to J. G. LANGHAM, Esq. Solicitor, Uckfield; Messrs. J. G. LANGHAM & SON, Solicitors, Hastings; to the Auctioneer, Church-street, Uckfield; at the Maiden's Head Hotel, Uckfield; the Star Hotel, Lewes; the King and Queen Hotel, Brighton; and the Sussex Hotel, Eastbourne.

WIMBLEDON CAMP.—Sale of Timber.

MR. THOMAS ACTON, of Manchester, will SELL by AUCTION, on MONDAY next, the 29th, and TUESDAY next, the 30th JULY, 1867, the TIMBER used in fencing and preparing the Common for the above meeting. The Stock consists of upwards of 600 squares of pitch-pine prepared flooring, 1,000 squares of first-quality yellow do. Petersburg prepared flooring of various widths, 15,000 feet of quartering, immense stock of deals, boards, &c.; together with the bricks, and gas and water piping, ginger-beer bottles, &c. Sale to commence each day at ELEVEN in the morning prompt. Catalogues to be had at the Sale. The Timber may now be viewed on the Common.

BERMONDSEY.—To Builders, Contractors, Carpenters, and Others.

MR. E. DRESSER ROGERS is instructed to SELL by AUCTION, on the PREMISES, Abbey-street, adjoining the London, Brighton, and South Coast Railway, on WEDNESDAY, JULY 31, at TWELVE for ONE, the surplus STOCK and PLANT of a Builder and Contractor, comprising planks, deals, battens, boards, slabs, die square, scaffold boards and poles, puttos, centres, sand screens, mortar boards, bankers, boxes, stone truck, horse and barrow runs, blocks and falls, builder's cart, barrows, York and Bath stone, bricks, pantiles, old iron, benches, ladders, old stuff, &c.—Catalogues on the Premises, and at the Auctioneer's Offices, Townhall chambers, Borough, S.E.

LOUGHTON PARK ESTATE, ESSEX.—Choice Freehold Building Sites, adjoining the station, and within forty minutes of the termini at Fenchurch street and Bishopsgate.

MR. V. BUCKLAND is instructed to SELL by AUCTION, at the MART, Tokenhouse-yard, Lothbury, on THURSDAY, AUGUST 1st, at TWO o'clock precisely, the first portion (consisting of about thirty acres) of a valuable FREEHOLD BUILDING ESTATE, known as Loughton Park, adjoining the Railway station, and extending by a new road through the centre of the estate to the crown of the hill. The property commands fine views of Epping Forest, the valley of the Roden, and a vast extent of interesting scenery to the south and west. It is well timbered, and will be sold in lots, from a quarter of an acre to three and four acres in extent, according to position. Sewers are laid down for houses and surface drainage, and gas and water will be supplied. Such stipulation will be made as to the value of houses to be erected.—Particulars with plans may be obtained of Messrs. GRILLATY, SON, & WARTON, Solicitors, 3, St. Michael's-alley, Cornhill, of J. G. B. MARSHALL, Esq. Stratford; at the Crown Inn, Loughton; Baldfaced Stag, Buckhurst-hill; at the Mart; and of Mr. V. BUCKLAND Surveyor, 72, Cannon-street, City.

To Contractors, Carmen, and Others.—Absolute Sale.

MR. ROBERT BOYCE has been favoured with instructions from the Executors of the late W. Dethick, esq. to SELL by AUCTION, on the WORKS, Paragon-row, Rodney-road, Walworth, near the Elephant and Castle, on WEDNESDAY and THURSDAY, AUGUST 7 and 8, at TWELVE for ONE each day, the FIRST PORTION of the valuable STOCK and PLANT, comprising a nearly new 14 horse power portable steam-engine with double cylinder, by Roby; an 8-horse single-cylinder ditto, by Roby; Middleton chain-pump, pile-driving machines, crabs, 12-inch auger, pumps, sling chains, wood and iron skips, contents of smiths' shops, office boxes, bar, rod, and sheet iron; 5,000 3-inch deals, 5-inch and 6-inch dye square, tool boxes, 14 young cart-horses, useful ring timber wagon, builder's spring cart, 12 single-sheet carts, dog, nearly new wagonette, 20 lots of thill and chain harness, and other effects. May be viewed two days previous and morning of sale. Catalogues had of Messrs. LINDO & SONS, Solicitors, 47, Moorgate-street; on the Works; and at the Auctioneer's Offices, 47, High-street, Hoxton.

Valuable Building Land, close to the Crystal Palace.

MESSRS. WARTERS & LOVEJOY are instructed to SELL by AUCTION, at the GUILDHALL COFFEEHOUSE, Gresham-street, E.C. on WEDNESDAY, AUGUST 7th, at ONE o'clock, a most eligible Plot of BUILDING LAND, situate at the corner of Rock Hill and Sydenham Hill road, having a frontage of 263 feet by a depth of 160 feet, commanding both front and rear most beautiful views. The situation is most desirable, being close to the Palace and the railway stations (the high-level being the nearest), giving easy and quick access to all parts of London. The neighbourhood around is of a highly respectable character. The property will be offered first in one lot, and if not sold, then in six lots, with frontages varying from 30 feet to 70 feet.—Particulars and plans may be obtained of Messrs. BRUNDRETT, MARTIN, RANDALL, & GOWETT, Solicitors, 10, Kings Bench-walk, Temple; of Messrs. EDWARDS & EDWARDS, Solicitors, 23, Southampton-buildings, W.C.; at the White Hart, Norwood; at the Guildhall Coffee-house; and of the Auctioneers, 97, Chancery-lane.

FOREST GATE.—Building Materials of the spacious Mansion known as Forest House, Ranges of Stabling and Coach-houses, Two Cottages, a large quantity of valuable growing Timber, &c. to clear the ground for building purposes.

MESSRS. WINSTANLEY & HORWOOD have received instructions from the Conservative Land Society to SELL by AUCTION, on the PREMISES Forest House, Forest Gate, Essex, near the Eagle and Child, on MONDAY, JULY 29, and following day, at TWELVE, in lots, all the valuable BUILDING MATERIALS, Fixtures, and Fittings-up of the MANSION and OFFICES, Two Cottages, Stabling, and Coach-houses; comprising about 350,000 excellent stock bricks, 57 squares of slates, pantiles, prime oak and fir timber, in stout girder, rafters, joists, and quartering, French casements, glazed plate-glass, 60 pair sashes, 70 doors, various, sound floor-boards, handsome carved black and gold statuary and vein marble chimney-pieces, York and pebble paving, granite pitchings, stone steps, coping and window cills, several thousand feet run of iron railing and gates, hurdle and wire fencing, mill of wood fencing, coach-house and entrance-gates, racks, mangers, and stable fittings, section of large greenhouse and vinery with hot-water apparatus, several tons of lead, in flats, gutters, cisterns, pumps, and pipes, elegant register and other stoves, ranges, fenders, coppers, presses, and a variety of useful fixtures and fittings-up; also the whole of the growing timber on the estate.—May be viewed two days prior to the Sale, and catalogues had of Messrs. WINSTANLEY & HORWOOD, 10, Paternoster-row, St. Paul's, E.C.

BUDGE-ROW, CITY, near the Cannon-street Station.

MR. PERKINS will SELL by AUCTION, on the PREMISES, 26 and 27, Budge-row, Cannon-street, on TUESDAY, AUGUST 1st, at TWELVE for ONE o'clock, in lots, the capital BUILDING MATERIALS of 2 large WAREHOUSES, consisting of good sound bricks, tiles, oak and fir timber in girders, joists, rafters, &c. flooring, wainscoting, partitions, doors, sashes, iron columns, 2 lantern skylights, warehouse front, stout lead in gutters, flats, cisterns, pipes, &c. The fixtures comprise a crane and jib, 5 iron safes, a Wilson's 25-inch paper cutting machine, 3-die presses, heating apparatus, racks, desks, stoves, sinks, gasfittings, weighing machine, office fixtures, and effects.—May be viewed the day prior and morning of sale; catalogues had of Messrs. H. & J. D. MATHEWS, Architects, 10, Cloak-lane, Cannon-street, E.C.; on the Premises; and of the Auctioneer, 62, Tooley-street, S.E.

HERNE BAY, KENT.—Important Sale (by order of the Mortgagees of the valuable Freehold Properties, comprising the Pier Hotel and stabling, the Pier Inn, Clarendon House, St. George's Baths, and other eligible Premises, together with about seven Acres of first-class Freehold Building Land, in the heart of the town; also about four Acres of highly-productive Arable Land, a short distance from Herne Bay; the whole offering desirable opportunities for the profitable investment of capital.

MESSRS. BEADEL are instructed by the Mortgagees to SELL by AUCTION, at the MART, London, on THURSDAY, the 15th day of AUGUST, at ONE o'clock precisely, the above important PREMISES, including some of the principal buildings in this delightful watering-place. The Pier Hotel, which fronts the sea, has extensive accommodation. The whole in working order, and included in the sale will be the furniture and effects. In the rear of the hotel is the stabling for 20 horses, with fourteen loose coach-houses, harness-room, &c. with spacious yard entered from High-street; also a SHOP with dwelling, fronting John-street; in the High-street are the commodious premises known as the Pier Inn; adjoining the Pier Hotel, and fronting the Marine-parade, is the charming and convenient marine residence known as Clarendon House. St. George's Baths have extensive frontage to the Esplanade, and contain seven private bath and dressing rooms, with a suite of private apartments and domestic offices, also a large plunge-bath, which could be supplied from the sea; and included in this sale will be the bathing-machines fronting the Esplanade, and a short distance from the baths are the convenient premises late in the occupation of Messrs. Shepherd & Neame, brewers, suitable for trade purposes. The freehold building-land comprises some very desirable sites, situated in the centre of the town, near to the principal buildings, and with extensive frontages to the sea and to the most important thoroughfare in Herne Bay, all of the White Post field, containing about four acres, situate at Herne, a short distance from the town. Nearly the whole of the above valuable premises are let to responsible tenants; the buildings are of a substantial character, and the most important have recently undergone decorative repair.—Plans, with particulars and conditions of sale, may be obtained of Messrs. WINDUS & AMYS, Epping Forest; at the Pier Hotel, Herne Bay; at the Mart; and of Messrs. BEADEL, 25, Gresham-street, London, E.C.

BEULAH PARK.—A highly important and valuable Freehold Building Estate at Upper Norwood, one of the most beautiful and healthy districts in the county of Surrey.

MESSRS. BLAKE will SELL by AUCTION, at the MART Tokenhouse-yard, on WEDNESDAY AUGUST 7th, 1867, at ONE for TWO o'clock, in two lots, the first portion of the fine BUILDING ESTATE known as "Beulah Park;" comprising an area of about 50 acres on the side of Beulah Hill, facing the south. The situation of this estate is almost unrivalled in this part of the county of Surrey, commanding as it does magnificent and uninterrupted views of the surrounding beautiful country. It is well adapted for drainage, and intersected by new roads, upon which and the existing roads building frontages of about 8,000 feet can be obtained, presenting most desirable sites for the erection of villa residences of a superior character. It is in the immediate neighbourhood of the Crystal Palace and several railway stations, and about seven miles from the metropolis. The upper portion of the land is within 150 yards of the Beulah-hill-road. The estate will be off-red in two lots, thus presenting to capitalists an opportunity to invest with profit, either by subdivision or otherwise. Immediate possession can be had.—May be viewed, and particulars had of J. J. SOLOMON, Esq. Solicitor, King-street, Cheapside; of J. FOGERTY, Esq. C.E. and Surveyor, 1, Westminster Chambers, Victoria-street; at the Auction Mart; at the Conquering Hero, close to the Estate; the Beulah Spa Hotel, Upper Norwood; and of Messrs. BLAKE, Croydon.

WIMBLEDON PARK, OAKLANDS.—A Freehold Property, containing 10a. 2r. 15p. of park land, with beautiful timber, well distributed over meadow land, overlooking the lake and Wimbledon Church, and commanding an extensive and varied view, approached from Putney by the Prince's-road, from Wandsworth by the Albert-road, and from Wimbledon by the Park-road, and within easy distance of the three stations of Putney, Wandsworth, and Wimbledon, and in every way thoroughly well adapted for residential purposes. At the north corner is a small villa residence, with two acres of land apportioned thereto; and adjoining, on the west, is another similar residence, and nearly one acre of land. On the re-sidue of 7¾ acres a large house has been erected, with stables, coach-house, gardens, conservatory, farmyard, &c. inclosed by an oak fence. The site is most attractive, and deserves a much better house, and possesses naturally all that is required for the enjoyment of a superior suburban residence, in a healthy and fashionable neighbourhood. The whole will be, therefore, offered in one lot, which will give the possessor wishing to erect a large mansion the opportunity of dealing with the smaller houses as he thinks fit. The future development of the land for building purposes will be much assisted by the frontage to existing roads on three sides of the property. The builder will have an opportunity of retaining the present houses, and adding others without the cost of road-making; and the whole affords a rare opportunity to several classes of purchasers.

MESSRS. DANIEL SMITH, SON, & OAKLEY have received instructions to offer this valuable FREEHOLD PROPERTY for SALE by AUCTION, at the MART, Tokenhouse-yard on TUESDAY, AUGUST 6th, at TWO precisely. Plans and particulars may be had of Messrs. PLEWS & IRVINE, 31, Mark-lane, E.C.; of HENRY HARRIS, Esq 34a, Moorgate-street; of CHARLES GAMMON, Esq 9, Cloak-lane, Cannon-street, E.C.; and of Messrs. TILLARD, SON, GODDEN, & HOLME, Solicitors, 34, Old Jewry, E.C; and of Messrs. DANIEL SMITH, SON, & OAKLEY, Land Agents and Surveyors, 10, Waterloo-place, Pall-mall, S.W.

London, Brighton, and South-Coast Railway.—Important Sale of Freehold Building Land.

MR. FULLER is instructed by the London, Brighton, and South-Coast Railway Company to SELL by AUCTION, at the LONDON TAVERN, Bishop-gate-street, on WEDNESDAY, AUGUST 7th, at ONE o'clock precisely, several Lots of extremely valuable FREEHOLD BUILDING LAND, advantageously situate at Rotherithe, Queen-road, Blenheim-grove, and Victoria-road, Peckham, Cold Harbour-lane, Brixton, Dulwich, Tulse Hill, Norwood, Horley, Three Bridges, and Hayward's Heath, offering most excellent sites for houses, shops, and villa-residences, being in close proximity to several important railway stations, and possessing frontages to good roads.—Particulars will be ready ten days prior to Sale, and may be had at the Secretary's Office, London, Brighton, and South-Coast Railway, London Bridge Terminus; Messrs. FAITHFULL, SON, & COODE, solicitors 3, Whitehall-gardens, and Brighton; of the Stationmasters at Rotherhithe; Rye-lane, Peckham; Cold Harbour-lane, Brixton; Lower Norwood, Horley, Three Bridges, and Hayward's Heath; at the London Tavern, Bishopsgate-street; and of Mr. FULLER, Estate Auctioneer and Surveyor, 3, Whitehall-gardens.

London, Brighton, and South Coast Railway.—Dorking. Beautiful Freehold Building Estate.

MR. FULLER is instructed by the London Brighton, and South Coast Railway Company to SELL by AUCTION, in AUGUST, a very beautiful FREEHOLD BUILDING ESTATE of 25 Acres, peculiarly eligible for the erection of first-class houses or villa residences, being situated in the most popular, picturesque, and healthy neighbourhood of Dorking, in the county of Surrey, enjoying superior railway accommodation, being immediately adjoining two stations having direct communication with all parts of the metropolis and the Southern and Midland Counties, and of all the fashionable watering-places on the South Coast, prettily timbered, and possessing commanding frontages to good roads. To be sold in lots of various sizes to suit all purchasers.—Particulars, with plans, will shortly be published, and may be had at the Secretary's Office, London, Brighton, and South Coast Railway, London Bridge Station, London Bridge; of Messrs. BAXTER, ROSE, NORTON, & CO. Solicitors, 6, Victoria-street, Westminster; of the Station Masters at Dorking and Redhill; at the White Horse Hotel, High-street, Dorking; at the London Tavern, Bishopsgate-street; and of Mr. FULLER, Estate Auctioneer and Surveyor, 3, Whitehall-gardens.

MR. WILLIAM STUART CANDSELL, ARCHITECTURAL ARTIST, prepares for the Profession—
Academy Pictures, Competition Designs, Landscape Views, Interiors,
And Artistic Work in Oil or Water-colour.
24, WINCHESTER-STREET, S.W.

TO ARCHITECTS AND OTHERS.

ARCHITECTURAL DRAWINGS COLOURED for Competition or Exhibition; Perspectives, Designs, Sketches, or Finished and Working Drawings prepared from rough sketches or Instructions. First-rate references from eminent men.—Address, ARTIST, 8, Bessborough-street, Pimlico, S.W.

ARCHITECTURE.—A Gentleman, aged 26, is desirous of obtaining a JUNIOR PARTNERSHIP, or a Situation as Senior Assistant in the above Profession. Country preferred.—Address, A. B. The Firs, Caversham, Reading.

BOROUGH of LEEDS.—WANTED, by "The Becks Committee" of the Council of the Borough of Leeds, a CLERK of the WORKS to superintend the excavating, paving, and building and retaining walls for improving the Hol-beck within the borough.—Further information can be had on applying to Mr. ALFRED M. FOWLER, C.E. Borough Surveyor, Town-hall, Leeds. Wages 42s. per week. Applicants must send testimonials, and also state the nature of the work they have been accustomed to, not later than THURSDAY, the 15th of AUGUST next, addressed to "The Becks Committee," Town Clerk's-office, Leeds, endorsed, "Application for Clerk of Works."—By order,
Leeds, 19th July, 1867. C. A. CURWOOD, Town Clerk.

CLERK of WORKS.—WANTED, a good practical Man, accustomed to Warehouse and City Work.—Apply by letter (with reference), to Mr. DENNISON, Architect, 33, King-street, Cheapside, E.C.

LEOMINSTER WATER SUPPLY and DRAINAGE.—The Leominster Local Board are prepared to APPOINT a CLERK of the WORKS, to superintend the Construction of the Drainage and Waterworks.—Applications, with references, and stating terms, to be sent to me on or before the 1st day of AUGUST next. Testimonials not to be sent unless applied for.
GEO. THOS ROBINSON, Clerk to the Local Board.
Leominster, 22nd July, 1867.

WANTED, SEVERAL FIRST-RATE FIGURE CARVERS or MODELLERS.—Address, stating terms and reference, to No. 151, Office of "The Builder."

MOULDING MACHINE.—WANTED, a SITUATION as MOULDING MACHINE WORKER. Can make cutters, and do repairs. No objection to go abroad. Good reference.—Address, J. L 3, Garden-row, Hill-street, Walworth, S.

TIMBER TRADE.—WANTED, a good BOOKKEEPER, at one of the out-ports. Unexceptionable references required.—Apply to A. Z. care of A. H. Baily & Co. Cornhill, London.

TIMBER TRADE.—WANTED, in a Timber Yard and Saw-Mills, in a provincial town, as FOREMAN and SALESMAN, a thoroughly practical Man, well acquainted with the trade. All applications to be accompanied with testimonials, and to state salary required.—Address, No. 1, South-place, Finsbury, E.C.

THE Local Board of Northam, near Bideford, in the county of Devon, require the SERVICES of a CIVIL ENGINEER, to make a careful examination of their district, and report to them upon the best means of putting its sewerage and water supply upon a sound and efficient footing. Civil engineers willing to undertake this employment, are requested to apply (free of charge) to C. W. HOLE, Esq of Bideford, Devon. Clerk to the Board, stating their charges for such a preliminary examination and general report. Population of the parish about 4,000, more than half of which live in the seaport town of Appledore

TIMBER TRADE.—WANTED, a TOWN TRAVELLER.—Address, with particulars, 970, Office of "The Builder."

TO GAS-FITTERS, &c.

WANTED, for a large JOB, a good WORKING GAS-FITTER. Must be one accustomed to extensive Works, and well up in his business.—Apply to the Clerk of the Works, Hop and Malt Exchange-buildings, Southwark-street, Borough, S.E.

WANTED, in the Office of an Architect and Surveyor in the country, an experienced ASSISTANT.—Address, stating terms and where previously employed, No. 231, Office of "The Builder."

WANTED, permanently, by a Builder and Surveyor, a CARPENTER and JOINER, to assist in the office, and willing to work at the bench if required.—Address, in his own handwriting stating age, where last engaged, and salary expected, to CORNICK & SONS, Builders, Bridport, Dorset.

TO ENGINEERS AND SURVEYORS.

WANTED, for a short period, THREE ASSISTANTS, who must be quick and accurate Levellers, and accustomed to Town Surveys.—Apply, with terms, to Mr. J. E. GREATOREX, Borough Engineer, Portsmouth.

WANTED, as CARPENTER, &c. a Man who understands Making Garden Lights, and who can Paint and Glaze. The engagement would be permanent to a suitable person.—Address, with wages required, to Mr. WM. BULL, Establishment for New and Rare Plants, King's-road, Chelsea, London, S.W.

TO PLUMBERS.

WANTED, by a Builder in the country, a THREE-BRANCH HAND. Must be a good plumber. Constant place. Moderate wages, to meet country prices.—Address, IXION, Post-office, Buckingham.

WANTED, a first-class ARCHITECT'S ASSISTANT. Must be also a good perspective draughtsman and colourist.—Apply to Mr. R. J. GOODACRE, Architect, 5, Friar-lane, Leicester.

WANTED, a thoroughly competent person, to TAKE CHARGE of a BUILDER and CONTRACTOR'S OFFICE, in the South of England. He must be a good accountant, quantity taker, and estimator; well up in London prices. Must have filled a similar situation. None whose character will not bear the strictest investigation need apply.—Apply, with testimonials, stating age, salary required, and other particulars, in the first place, to D. M. O. care of Davies & Co. Advertising Agents, Finch-lane, Cornhill.

TO PLUMBERS.

WANTED, a good THREE-BRANCH HAND. Good references required.—Apply, personally, to Mr. HIGH, Builder, Clarence-road, Lower Clapton.

TO BUILDERS' FOREMEN.

WANTED, a thoroughly good WORKING FOREMAN (carpenter and joiner by trade); one who is not afraid of using the tools.—Address, stating references and wages required, C. 10, Princes-street, Spitalfields.

TO SASH MAKERS.

WANTED, ONE or TWO good WORKMEN, accustomed to this branch of the trade, to take a number of Sashes and Frames to make, Piecework.—Address, stating where last employed, to No 190, Office of "The Builder."

TO FOREMEN OF STONE AND MARBLE MASONS.

WANTED, an energetic, well-educated Man, aged 25 to 30, in the above capacity.—Address, with full particulars, in own handwriting, to J. W. BIRD, 145, Euston-road, N.W.

WANTED, in an Architect and Surveyor's Office a Young Man who writes a good hand, who has had some practice in E-timating, &c. and who can make himself generally useful.—Applications in writing to be sent to 196, Office of "The Builder."

WANTED, immediately, a CLERK, in a Builder's Office in the country. Well up in drawing, taking out quantities, bookkeeping, &c.—Address, with references, salary required, and age, to A. W. Post-office, Colchester.

TO BUILDERS, IRONMONGERS, AND OTHERS.

WANTED, by a repectable Married Man, aged 31, a constant SITUATION, as Gasfitter, Bellhanger, Locksmith, and plain Zinc Worker; he thoroughly understands hot and cold water work. Good references, if required.—Address, J. S. 1, Hibernia-road, Grove-road, Hounslow, Middlesex.

TO SAWMILL PROPRIETORS BUILDERS, AND OTHERS.

WANTED, by the Advertiser, a SITUATION as SAW-SHARPENER, or to work timber, deal frame, circular, or band saw. Has had sixteen years' experience. Can give good references.—Address, Mr. J. ELLISS, 117, Cathcart-street, Birkenhead, Cheshire.

WANTED, by the Advertiser, a CONSTANCY as PAPERHANGER. No objection to fill up time painting, &c.—Address, stating terms, F. B. G. 71, York-place, Old Town, Croydon.

WANTED, in a month's time, a SITUATION as TIME or STORE KEEPER, and to make himself generally useful. Is a good accountant. Good references.—Address, G. B. MARCH, Cambridgeshire.

TO ARCHITECTS AND ENGINEERS.

WANTED, a RE-ENGAGEMENT, by a first-class CLERK of WORKS. Six years in last engagement, with the highest references.—Address, M. H. Post-office, Clapham Common, S.

TO BUILDERS AND CONTRACTORS.

WANTED, by a thoroughly energetic Man, with good references and testimonials, a RE-ENGAGEMENT as FOREMAN of PLASTERERS. No objection to piecework. In town or country. Aged 35.—Address, H. B. 32, Vincent-square, Westminster, S.W.

WANTED, by a good PLUMBER, Gasfitter, &c. a constant SITUATION. Town or country. State wages given.—Address, G. M. HOPE, Queen-street, Hammersmith.

TO BUILDERS, PLUMBERS, AND OTHERS.

WANTED, by a good Workman, a SITUATION as PLUMBER or THREE-BRANCH HAND. Good references if required. Town or country.—Address, F. G. No. 3 Camillia-street, Wandsworth-road.

TO ARCHITECTS.

WANTED, by an ASSISTANT, who is an efficient draughtsman, &c. a RE-ENGAGEMENT in a London office. Good references.—Address, C. H. 42, Eleanor-road North, Hackney, N.E.

TO BUILDERS AND OTHERS.

WANTED, by a thoroughly practical Man, a RE-ENGAGEMENT as SHOP or GENERAL FOREMAN. Would not object to a good country job.—Address, A. B. C. 109, St. James's-road, Liverpool-road, N.

TO BUILDERS AND CONTRACTORS.

WANTED, a RE-ENGAGEMENT, by the Advertiser. Is thoroughly experienced at taking off quantities, measuring, estimating, accounts, &c. First-class references.—Address, J. A. 4, Herne-place, Dulwich, S.

TO BUILDERS.

WANTED, by a first-class PLUMBER, CONSTANT EMPLOYMENT, or otherwise. References to abilities and conduct if required. No objection to the country.—Address, No. 153, Office of "The Builder."

TO BUILDERS, PLUMBERS, &c.

WANTED, by a respectable Married Man, a CONSTANT SITUATION as a thorough good PLUMBER, Gasfitter, and Zincworker. Town or country. Good references if required.—Address, J. BURTON, care of Mr. Hawkins, Stationer, Hanworth-road, Hounslow, Middlesex.

TO BUILDERS, &c.

WANTED, an ENGAGEMENT, by an experienced Man. Aged 39. Has had over fifteen years' experience as general manager of building operations. Carpenter and Joiner by trade. Town or country.—Address, G. V. 205, Tottenham-court-road, W.C.

TO BUILDERS AND SPECULATORS.

WANTED, by the Advertiser, a RE-ENGAGEMENT, as CARPENTER and JOINER, to take work by the piece or job. Good references. Locality no object.—Address, E. R. N. 7. Leonard-terrace, Old Dover-road, Blackheath.

TO ARCHITECTS.

WANTED, an ENGAGEMENT, by a Young Man, aged 22. Is well up in detail and working drawings, also colouring and perspective. A moderate salary only required.—Address, J. C. 33, Trevor-square, Knightsbridge, London.

TO BUILDERS AND CONTRACTORS.

WANTED, a RE-ENGAGEMENT as SHOP or GENERAL FOREMAN, or will take the Labour of any quantity of Carpenter's or Joiner's Work.—Address, S.M. 41, Joseph-street, Bow-common.

TO BUILDERS, &c.

WANTED, by an intelligent Youth, aged 18, who writes well, and is quick at figures, a SITUATION as JUNIOR CLERK.—Address, X. Y. Z. 29, Larkhall-rise, Clapham.

WANTED, by an experienced Man, a SITUATION as WORKING FOREMAN of PLASTERERS. Town or country. Good reference.—Address, A. N. 35, Grenes-street, Rathbone-place, Oxford street.

WANTED, by a thoroughly practical, energetic Man, a RE-ENGAGEMENT as FOREMAN of PLASTERERS, or General Foreman. Has had great experience, is a good modeller, and can make out working drawings. Or Piecework. A builder's son, aged 40.—Address, A. B. C. Post office, High-street, Clapham.

TO BUILDERS AND OTHERS.

WANTED, by a steady Man, a SITUATION as FOREMAN of PAINTERS. Thoroughly understands mixing of colours, can do graining, and take the entire management of the painting department. Has been for man as above fourteen years.—Address, A. Z. 4, Weymouth street, New Kent-road.

TO STAIRCASE MAKERS.

WANTED, by a HOUSE JOINER, aged 27, who has for some time studied the theory of stair and handrail work, a JOB where he might make himself practically acquainted with the above under a good workman.—Address, CARPENTER 35, Edmund-terrace, Notting-hill.

TO BUILDERS AND OTHERS.

WANTED, EMPLOYMENT, as TIME or STORE KEEPER, or any place of trust. Make himself generally useful. Five years' good character.—Address, J. K. 59, William-street, Caledonian-road, N.

WANTED, by the Advertiser, an ENGAGEMENT in an ARCHITECT'S OFFICE. Is a neat draughtsman and good colourist. Testimonials and specimen drawings produced if required. Salary, 110l. a year.—Address, E. G. M. 7, East India Avenue, Leadenhall-street, E.C.

WANTED, a SITUATION as CLERK, TIME or STORE KEEPER on Builders'-Contractors' Works or a Wharf. Has had seven years' experence in similar occupations under the leading railway contractors. Good references.—Address, stating duties required, with salary, W. R. F. 8, Trelawn-terrace, Hendon, N.W.

TO BUILDERS AND OTHERS.

WANTED, by the Advertiser, aged 23, a SITUATION, as PAINTER, GRAINER, &c. Town or country.—Address, J. W. 37, Euston-road, N.W.

TO BUILDERS.

WANTED, a RE-ENGAGEMENT as SHOP or OUT-DOOR FOREMAN, or take Charge of a Job. Town or country. Thoroughly understands the Setting out of Work, in every branch. Prepares Plans and Working Drawings. Testimonials as to ability, &c.—Address, L. M. Mr. Barrows, 11, Moreton-street, Pimlico, S.W.

TO BUILDERS AND TIMBER MERCHANTS.

WANTED, a SITUATION, by an experienced LATH RENDER. Good reference.—Address, D. K. 1, Hornsey-road, Citizen-road, Holloway, London.